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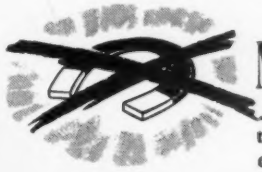

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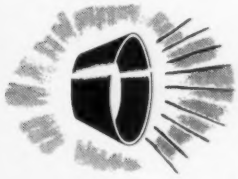

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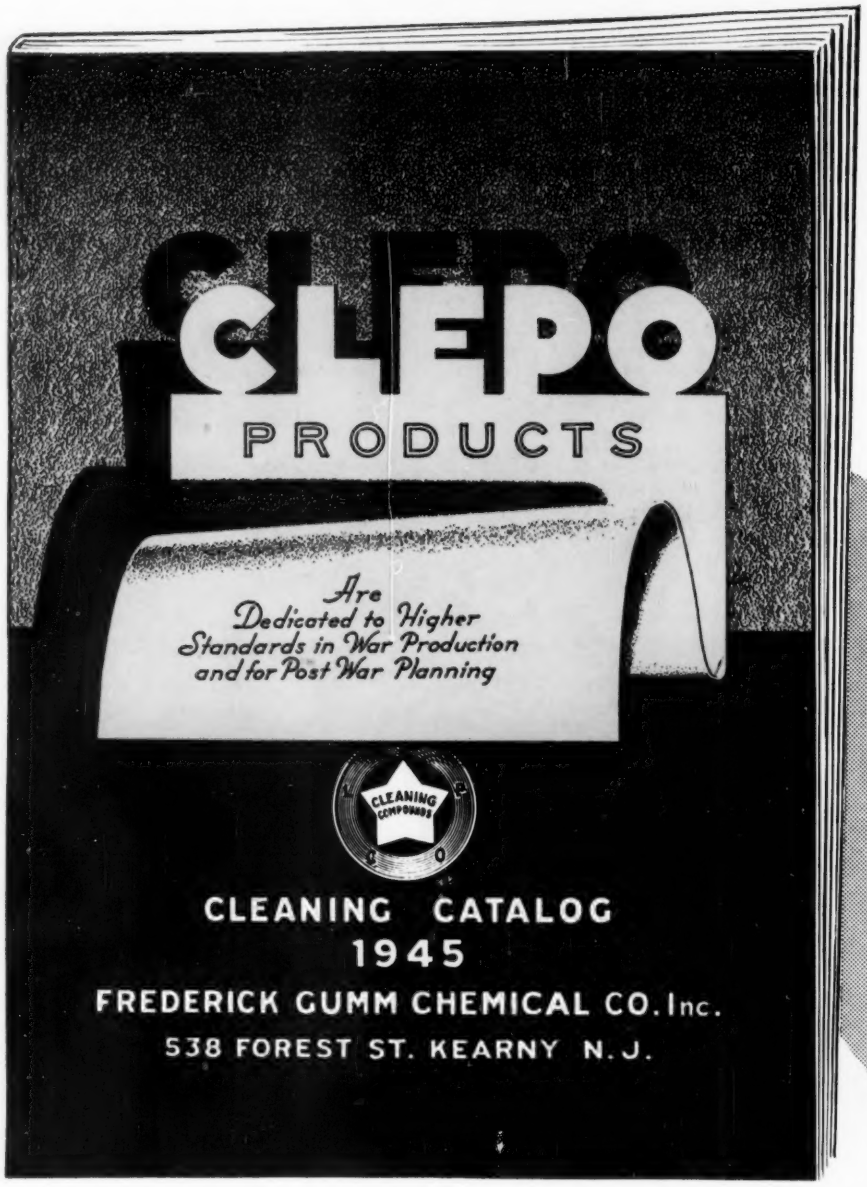

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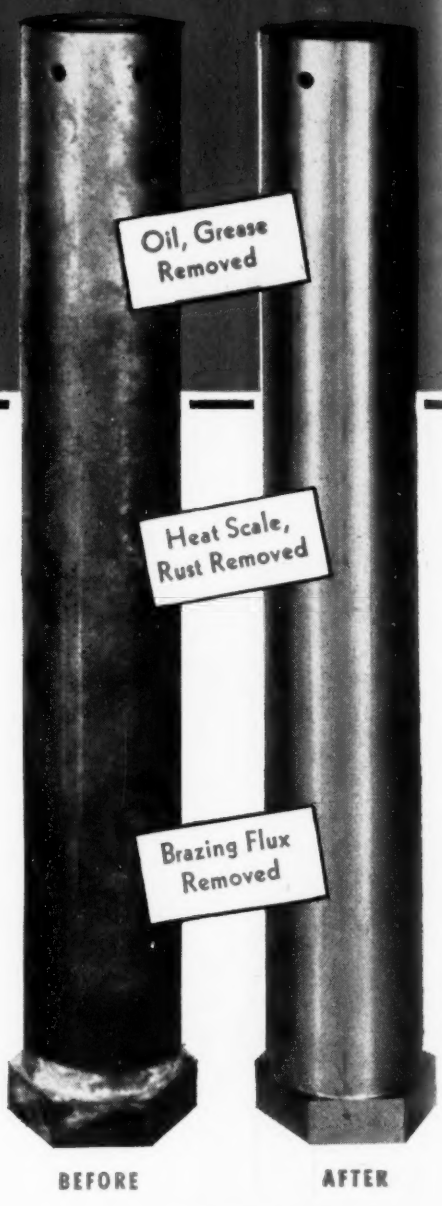

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METAL FINISHING is Published monthly by the Metal Industry Publishing Company, 11 West 42nd Street, New York, N. Y., U. S. A.
Entered as second class matter February 25, 1903, at the Post Office in New York under the Act of March 3, 1879.
Volume 43, Number 3, March, 1945. Two Dollars Per Year.

Founded as METAL INDUSTRY.
January, 1903 by
PALMER H. LANGDON
1868-1935

METAL FINISHING

VOLUME 43 MARCH, 1945 NUMBER 3

Publication Office
11 West 42nd St.
New York 18, N. Y.

L. H. LANGDON
Publisher

THOMAS A. TRUMBOUR
Business Manager

NATHANIEL HALL and
G. B. HOGABOOM, Jr.
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JOAN TRUMBOUR
Advertising Manager

On Leave with the Armed Forces

Palmer H. Langdon
1st Lt. C. E., U. S. Army

PUBLISHED MONTHLY—Copyright 1945 by The Metal Industry Publishing Company, Incorporated, 11 West 42nd St., New York 18, N. Y. Entered February 25, 1903, at New York, N. Y., as second class matter under Act of Congress, March 3, 1879. Re-entered as second class matter June 13, 1940, at the post office at New York, N. Y., under the Act of March 3, 1879.

SUBSCRIPTION PRICES: United States, $2.00 per year; Canada, $2.50 per year (includes 50c exchange and tax). Foreign $3.00. Single copies 25c. Please remit by check or money order; cash should be registered.

ADVERTISING RATES on application. Forms close the 25th of preceding month. Advertising copy should be mailed in time to reach us on or before the 20th of the preceding month.

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VOL. 43, NO. 3 METAL FINISHING MARCH, 1945
PREPARATION, ELECTROPLATING, COATING

Production After the War

The seller's market, which we have been experiencing during the last few years, has been a source of gratification for manufacturers, even though it has often been accompanied by some very difficult problems, such as the labor, materials and transportation situations. Such a market, however, usually has serious consequences.

Because of the eager market for products, price has become a minor consideration and, as a result, there has been noted a dangerous tendency to become careless about costs of production. When normal times return and contracts are again placed on a competitive basis, many manufacturers will find themselves unprepared for the task of producing on a sound economic footing. Bidding on a wartime basis, contracts will be lost because operating and overhead costs are too high.

The curious thing about the whole matter, and the angle which is not usually considered unless pointed out, is that, since the high bidder does not get as much work, his fixed charges must be apportioned among a smaller output, whereas, the lower bidder gets more business and distributes his fixed charges over a larger output. The low bidder, therefore, operates at a lower cost of production, while the high bidder progressively increases his costs as he obtains fewer and fewer contracts—higher costs resulting in less business, less business resulting in still higher costs, which, in turn, results in still less business and so on.

Reduction of operating costs to a minimum, consistent with efficiency, is the answer. Metal finishing departments, as the source of a significant percentage of total manufacturing cost, will come in for their share of attention and many savings will undoubtedly be possible. Instead of running depleted chromic acid plating and anodizing solutions into the sewer, they will be sold to local tanneries, greaseless polishing compounds will be refrigerated to reduce waste, lacquer overspray will be recovered, plating racks will be insulated to minimize, for example, the purchase of nickel anodes at 50c/lb. to be resold as clippings and peelings at 5c.

Only by examining every possible source of cost improvement will it be possible to maintain profitable sales volume and now is the time to start taking stock of production costs.

Determining the Area of Parts to be Plated

By JOSEPH HAAS

Industrial Engineer

ELECTRODEPOSITING a metal to a specified amount per article or unit of articles does not present any difficult problem. All that is required is simple multiplication, knowing the total amount of metal to be deposited, and then calculating the time at a certain amperage to obtain that quantity of metal, making allowances for the current efficiency of the solution.

Problem:

Time to deposit: 6 troy oz. of silver per gross of forks.

Solution:

(1) Pieces per rack = 72
(2) Racks per load = 12 = 864 pcs. = 6 gross
(3) Specification: 6 oz./gr. = 36 oz./load
(4) Plating amperage = 220 amperes
(5) Cathode efficiency = 100%
(6) Safety factor = 5%

$$T = \frac{W}{A \times C} = \frac{36}{0.1295 \times 220} = \frac{36}{28.49}$$

= 1.27 hours = 1 hour and 16 minutes
Plus 5 minutes for racks = 1 hour and 21 minutes
Plus 5% safety factor = 1 hour and 25 minutes

T = Time in hours.
W = Total metal to be deposited in troy oz.
A = Metal deposited per ampere hour in troy oz.
C = Ampere input to tank.

The problem illustrated is applicable to the deposition of any metal on any type of products. However, when electrodepositing to a specification that calls for a definite quantity of electrodeposited metal per square inch, per square foot, or a definite thickness of deposit, it is necessary that we know the surface area of the product being plated. There are several methods of determining the areas of articles, which may be listed as follows:—

1. *Areas of Geometric Figures.*

Divide or break up the article into common geometric figures. Calculate the area of each, and then add the results to obtain a total. Machinery's Handbook has about the best collection of various geometric figures, together with their formulas.

2. *Use of Graph Paper.*

Trace the article on graph paper of a definite number of divisions per inch (10 is the most convenient). Then count the squares.

$$\frac{\text{Number of squares}}{100} = \text{Square inches}$$

3. *Use of Prepared Charts.*

In the December 1941 issue of METAL FINISHING, Nathaniel Hall published a series of charts that can be used for determining the surface area of stampings. Accompanying the charts, examples are given illustrating their application.

4. *By Weight Comparison.*

Take a definite area of the stock from which the article is made. Weigh it, and also weigh the article. Calculate area of the article from the proportion:—
Weight of stock: Weight of article = Area of stock: Area of article.

5. *By Use of Standard Weight Tables.*

These tables can be found in the various handbooks or catalogs of metal manufacturers. They give the weight of 1 square foot (144 sq. in.) of metal for various thicknesses. By weighing the article of which the surface area is to be determined, and then finding the weight of 1 square foot of the metal thickness of the article, from the handbooks, as ready for plating, the surface area is calculated from the proportion:—
Weight per 144 sq. in.: Weight of article = 144: Area of article.
This method actually is the same in principle, as that described as method No. 4.

6. *By Planimeter.*

A planimeter is an instrument designed for the purpose of determining the area of any plane surface, no matter how irregular the outline, when such surface is represented by a figure drawn to scale.

The procedure is to lay the article on a piece of paper, and carefully trace the outline. By properly placing the planimeter in relation to the outlined article, a tracing point is moved along the outline. The area is determined by the difference of the reading on disk and the graduated wheel, at the beginning of the measuring movement, and at the end.

If the article is too large for the planimeter, the article can be drawn to a definite reduced scale, or can be divided into sections and the sections measured separately.

Planimeter measurements are correct within an error of about one percent.

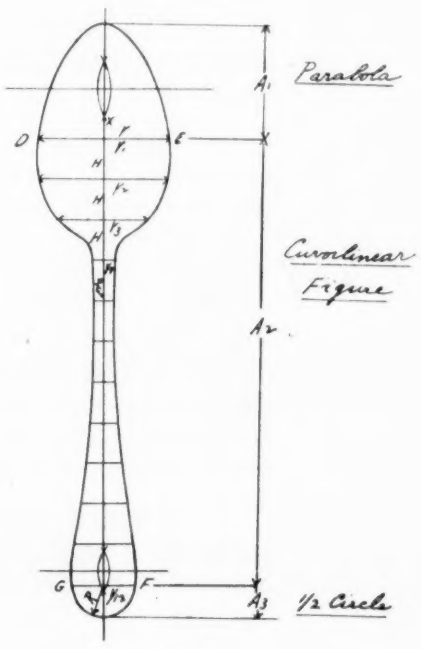

Figure 1

Illustrating Methods

1. *Areas of Geometric Figures:*

Figure No. 1 is the outline of a dessert spoon, divided into geometric figures.

A_1—Parabola

$$\text{Area} = \frac{2}{3} \text{ X Y}$$

$$= \frac{2}{3} (1.43 \times 1.63) = \frac{2}{3} (2.282)$$

$$= \frac{4.564}{3} = 1.521 \text{ square inches}$$

A_2—Curvilinear Figure.

By a formula, known as the trapezoidal rules we obtain:

$$\text{Area D E F G} = \frac{\text{H } (Y_1 + Y_n) + Y_2 + Y_3 + Y_4 \ldots Y_{n-1}}{2}$$

$$\frac{0.5 (1.63 + .78) + 1.60 + 1.11 + 0.30 + 0.27}{2} \quad 75$$

$$0.5 (7.27) = 3.635 \text{ square inches.}$$

A_3—½ Circle

$$\text{Area} = \frac{\pi R^2}{2} = \frac{3.1416 \times 0.39 \times 0.39}{2}$$

$$= \frac{3.1416 \times 0.1521}{2} = \frac{0.4778}{2} = 0.2389$$

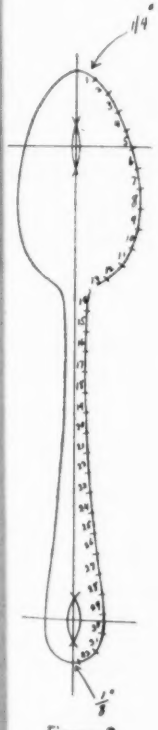

Figure 2

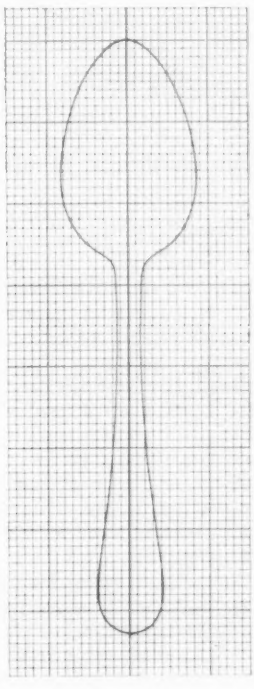

Figure 3

Figure No. 2 shows the edge or perimeter divided into ¼" sections:

$$\text{Perimeter} = 2 (32 \times ¼) + ¼$$
$$= 2 (8) + ¼ = 16¼"$$

Metal Thickness is 0.055"

Area of edge = $16.25 \times 0.055 = 0.89375$ square inches.

Area of 1 side = $A_1 = 1.521$

$A_2 = 3.635$

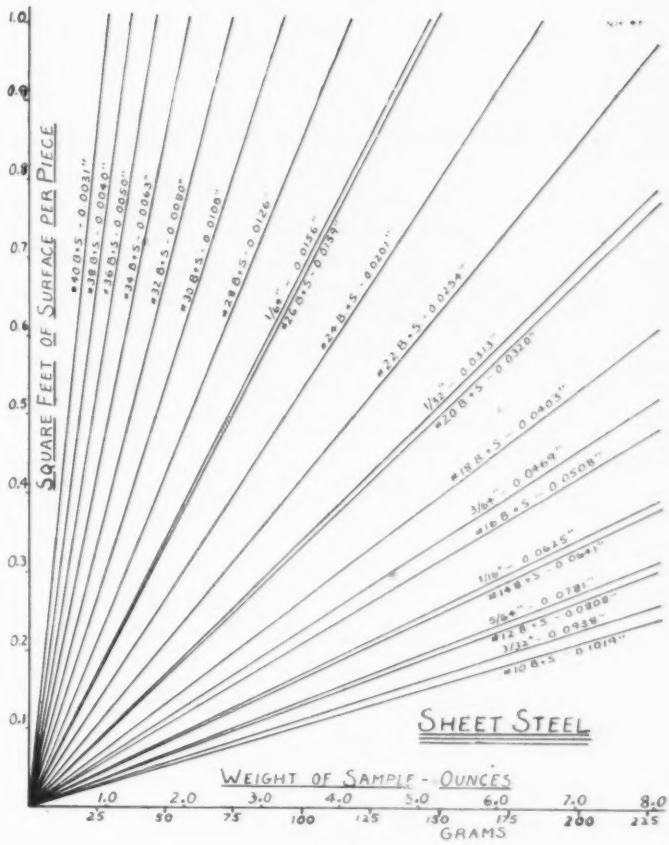

Figure 4

$A_3 = 0.239$

5.395

Area of 2 sides = 10.790

Area of edge = 0.894

Total area = 11.684 square inches

To show that edges should not be neglected in the determination of surface areas, attention is called to the fact that the area of the edge of the dessert spoon is 8.2% of the area of the two sides of the spoon, and 7.6% of the total area.

2. *Use of Graph Paper:*

This method of determining surface area is illustrated by Figure No. 3, a count of the number of squares for ½ of the spoon being 269 squares, and consequently 538 for the total of one side of the spoon. Therefore:

$$\frac{538}{100} = 5.38 \text{ square inches 1 side.*}$$

$5.38 \times 2 = 10.76$ square inches 2 sides.*

If to this, we add 0.89 square inches for the area of the edge as obtained through Figure No. 2, we have a total area of 11.65 square inches.

* *Note:*—A check count by another person gave 10.94 square inches.

3. *Use of Prepared Charts:*

Using Hall's Charts, and referring particularly to the one pertaining to sheet steel (Figure No. 4), we find that 0.055" steel is not recorded. So by interpolation, we draw in the 0.055" steel line.

The dessert spoon weighs 597 grains, or 1.37 oz. On the chart this amounts to 0.077 square feet for the dessert spoon. Therefore:

$0.077 \times 144 = 11.09$ square inches.

Adding 0.89 square inches for the area of the edge we obtain a total area of 11.98 square inches.

4. *By Weight Comparison:*

Taking a piece of 0.055" sheet steel (Figure No. 5) from which the dessert spoon is made, we calculate the total area:

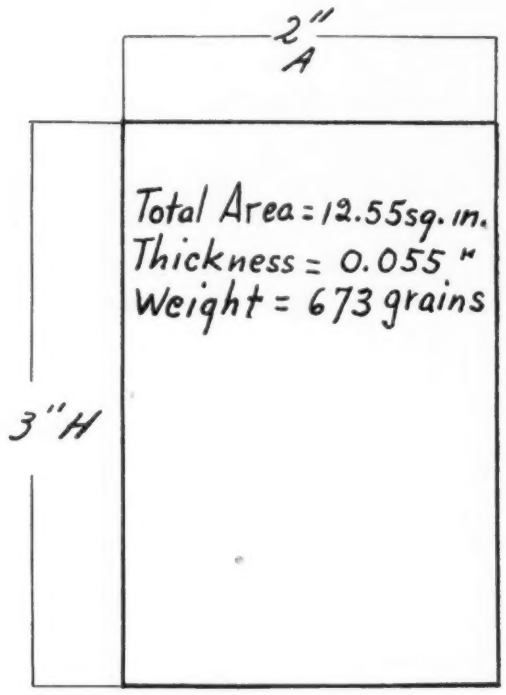

Figure 5

Area—1 side = H × A = 3 × 2 = 6 square inches.
Area—2 sides = 6 × 2 = 12 square inches.
Area of edges = 10 × 0.055 = 0.55 square inches.
Total area = 12 + 0.55 = 12.55 square inches.

The piece of steel weighs 673 grains, and the dessert spoon weighs 597 grains. Therefore:

Weight of sample	:	Weight of article	=	Area of sample	:	Area of article
673	:	597	=	12.55	:	X
		673X	=	12.55 × 597		
		X	=	$\frac{12.55 \times 597}{673}$		
			=	11.13 square inches.		

5. *By Use of Standard Weight Tables:*

Reference to a steel handbook gives the weight of 1 square foot (144 sq. in) of 0.055" steel as 2.25 pounds.

In order to minimize errors, a quantity of articles, if they are small or light, should be weighed. In the case of the dessert spoon which we are using as an example, 12 spoons were weighed. The weight was 1.02 lbs. We calculate the area of the dessert spoon:

Weight of steel per 144 sq. in.	:	Weight of articles	=	144 : X
2.25	:	1.02	=	144 : X
2.25X			=	144 × 1.02 = 146.88
		X	=	146.88
				$\frac{146.88}{2.25}$
			=	65.28 square in. for 12 pieces.
		1 piece	=	$\frac{65.28}{12}$ = 5.44 sq. in.

The weight of the metal from the handbook is expressed in linear sq. ft., *i.e.*—1 side. Therefore:

2 × 5.44 = 10.88 square inches.

Adding the area of the edges, not considered in the tables, we obtain:

10.88 + 0.89 = 11.77 square inches.

6. *By Planimeter:*

Figure No. 6 was made by tracing the outline of the dessert spoon. The figure was then traced over with the planimeter. Three different persons made readings, which were:

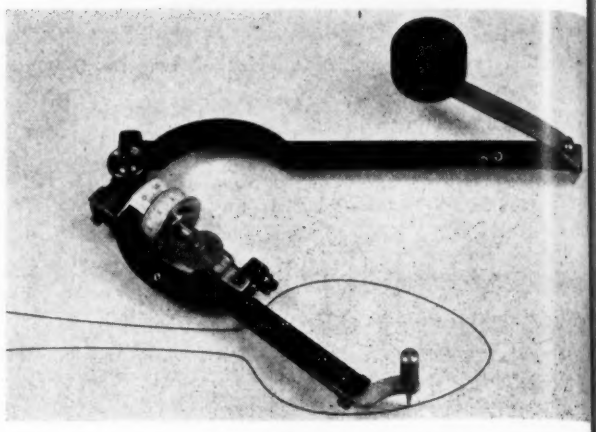

Figure 6

(A)	(B)	(C)
5.60	5.43	5.56
5.75	5.54	5.53
5.65	5.53	5.61
5.45	5.41	5.55
5.70	5.61	5.50
5.60	5.58	5.63
6 | 33.75	6 | 33.10	6 | 33.38
5.62	5.51	5.56

These figures represent the area of one side of the dessert sp and consequently have to be multiplied by 2. For the purpos this example (C) is chosen:

2 × 5.56	=	11.12 square inches
Adding the edge		0.89 " "
Total area		12.01 " "

Comparison and Discussion of Methods

Tabulating our results, we have for the various methods:

1. Geometric Figures	11.68	square inches
2. Graph Paper (Count of Squares)	11.65	" "
3. Hall's Charts	11.98	" "
4. Weight Comparison	11.13	" "
5. Standard Tables	11.77	" "
6. Planimeter	12.01	" "

These figures include the edges. However, it may be asked, which the six methods is the most accurate, because the largest part of surface area consists of the flat surface, and consequently the m important calculation.

Tabulation of flat surfaces for the various methods (No. 4 is cluded, because in that method edges were considered as a part of method), we have:

1. Geometric Figures	10.79	square inches
2. Graph Paper (Count of Squares)	10.76	" "
3. Hall's Charts	11.09	" "
5. Standard Tables	10.88	" "
6. Planimeter	11.12	" "

The difference between the highest (11.12) and the lowest (10. is 0.36 or 3¼%. It might be asked if 3¼% is too much of a va tion. Consequently let us check what the U. S. Government has say on measurements of areas.

From Federal Specification RR-T-51a for the silver plating of ta ware: *"It is not possible by any simple methods to measure the ar of irregularly shaped articles with high precision. By making a measurements, and following arbitrary assumptions, however, the a can usually be estimated with a probable accuracy within 10%."*

We have shown that with any of the above methods, we can obt a higher degree of accuracy than is expected in government spe cations. Therefore, which method you use is entirely dependent up what you have to work with. Take your choice, one method is good as the other. However, I would advise as a safety factor, wh ever possible or practical to choose that method, which gives greatest surface area.

Continuous Plating of Fine Steel Wire with Nickel*

By JAMES H. CONOLLY[1] and RICHARD RIMBACH[2]

Abstract

DUE TO the scarcity of nickel a nickel-plated steel wire is used today in place of solid nickel wire for tungsten filament supports in incandescent lamps. The steel wire passes through a concentrated Watts' nickel plating bath at the rate of 12 ft./min. (90 mm./sec.); at a current density of 200 to 600 amp./sq. ft. (22 to 65 amp./dm.^{2}); a bath pH of 2.0 and a bath temperature of 60°C. A very adherent nickel deposit (0.005 mm.) is obtained that may be safely subjected to sharp bends and which satisfactorily protects the steel basis during the life of the lamp.

Introduction

During the past decade, several European companies have been using nickel-plated steel wire as a filament support in incandescent lamps. Before the War, America consumed as much as 50,000 lb. (22 metric tons) of virgin nickel metal per month for these short leads and supports made of solid nickel. War Production Board Limitation Order No. L-28 specified nickel-coated wire as a substitute for solid nickel.

The filament support and lead is composed of three sections: the support section inside the bulb, the sealing-in section (copper clad nickel-steel wire) passing through the glass wall, and the outer, usually copper section which makes soldered contact with the brass base. The three sections, normally of different metals, are joined together by welding.

The part of the lead wire inside the bulb, formerly made of pure nickel, is now made of nickel plated iron wire. The section next to the brass base is now frequently made of copper plated iron wire. The upper end of the nickel-plated wire is flattened, and then bent almost flat on itself to make a hook to hold the tungsten filament. After the end of the filament is placed in this hook, the hook is flattened and closed to hold the tungsten filament tightly in place.

The nickel coating of this support wire must possess excellent adhesion and good resistance to any volatilization of the steel core of the support. If the nickel coating does not have good adhesion and ductility, the basis metal will be exposed in the formation of the hook which holds the tungsten filament.

The nickel plating of fine wire (sizes 0.010 in. to 0.090 in. diam. or 0.25 to 2.3 mm.) may be performed with ease and precision if a few variables are kept under fairly close control.

Procedure

The steel wire is received from the wire mill in 8 in. diameter coils of 10 to 15 lb. (4.5 to 6.8 kg.) weight which have been bright annealed after the final drawing operation at the mill to give a very soft ductile wire. These coils of wire are placed on uncoiling reels and started into the plating line which was designed to keep cold working of the wire at an absolute minimum. The wire, as shown in the accompanying schematic diagram (Fig. 1), travels in a horizontal path through the plating line, with only the tension

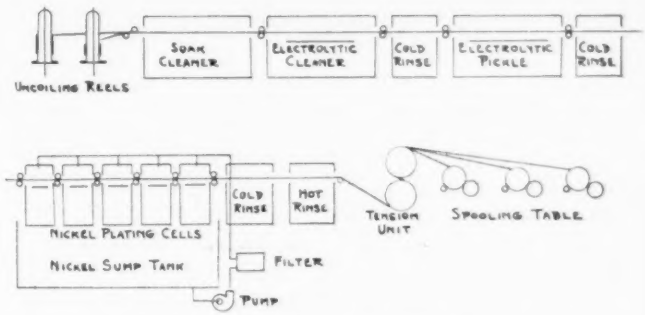

Fig. 1. Diagrammatic layout of nickel plating line.

drums and spooling operations flexing the wire. The tension to pull the wire through the line is very low, so that there is no danger of work-hardening the wire by too much tension.

The cleaning portion of the plating line consists of an alkaline soak cleaner, and alkaline electrolytic cleaner, and an anodic pickle, with rinses after each operation. With this sequence of operations all oil and dirt are removed in the alkaline cleaners, while the electrolytic pickle removes the surface oxides and imbedded drawing compounds used at the mill, to leave a surface smoothly etched which is free from smut or dirt. This surface is ideal for the direct nickel plating of the steel wire.

The actual nickel plating is carried out in five separate

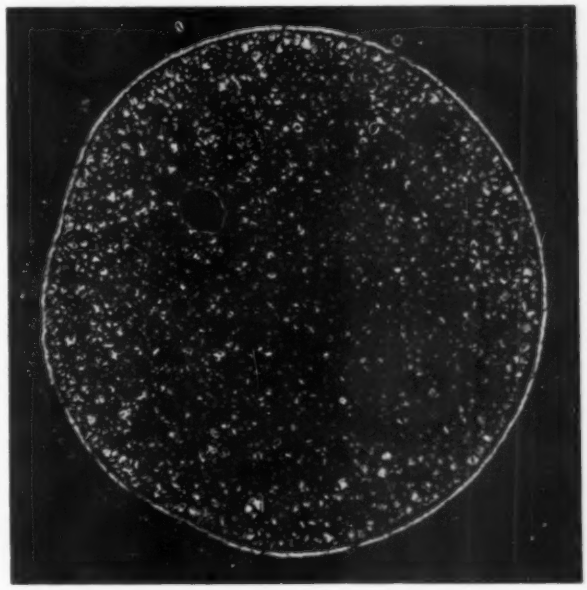

Fig. 2. Cross-section of nickel-plated wire. Coating thickness 0.002 in. Etched in nital. Magnification x 150.

* Paper presented at the 84th General Meeting of the Electrochemical Society, held in New York. Reprinted here with the Society's permission.

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cells, each one plating 1/5 the total thickness of nickel on the wire. Each cell is 24 in. (61 cm.) long, 12 in. (31 cm.) deep, and 40 in. (102 cm.) wide. The anodes are located beneath the wire. With the anodes on only one side of the wire, much simplicity of design is gained. The micrograph (Fig. 2) shows that the coating on the wire is uniform in thickness, even though the wire is out of round.

The major proportion of the steel wire plate receives a nickel deposit of 0.0002 in. (0.005 mm.) in thickness, while some wire is plated with double this thickness for special applications. The line operates at a forward speed of 10 to 15 ft. per min. depending on the size of the wire. In the case of the heavier nickel plating, the line speed is reduced 50%. The wire is treated in each step of the process as follows:

TABLE I.—NICKEL PLATING STEEL WIRE

Step	Time Sec.	Current Density amp./ft.²	amp./dm.²	Tank Voltage Maximum
Alkaline Cleaning	30*	200	21.6	8v.
Electrolytic Pickle	15	200	21.6	8
Nickel Plating	40	400	43.2	12

* 15 seconds spent in soak cleaner before entering the electrolytic portion of the alkaline cleaner.

The anodes are supported on carbon blocks, which conduct the current to the nickel anodes. One end of the carbon ell extends above the surface of the bath and is connected to the anode bus bar. By this method of conducting current into the anodes, no insulated hooks need be used on each individual anode. The anodes are placed on the carbon supports in any uniform manner to produce the anode-to-cathode spacing desired. There seems to be a definite limiting current density of about 125 to 150 amp./sq. ft. (13.5 to 16.2 amp./dm.²) for the proper dissolution of the nickel anodes. When the current density goes above this value, there is appreciable chlorine gas formed at the anodes. The actual current density at the point where the chlorine gas is formed may be much higher as this value was obtained by noting the total current and the total effective anode surface.

Optimum ranges for temperature and current density have been established for our particular bath. The temperature may be varied from 128° to 145°F. (53° to 63°C.) with no appreciable effect on the coating. The current density may be varied from 200 to 600 amp./sq. ft. (22 to 65 amp./dm.²) with no noticeable effect on the final product. Much higher plating current densities may be used on certain sizes of wire where the time to heat the wire to dryness is larger. The pump used in this line produced the desired result, so no further work was done on the amount of agitation required. Agitation is probably one of the most difficult factors in this line to evaluate.

Current Distribution

In order to study the current distribution in the wire, a number of measurements were made on a single plating cell with only one wire. The wire was held stationary and an anode having in the one case a length of 20 in. (51 cm.) in the other, 3 in. (7.6 cm.), was placed with its axis parallel to the axis of the wire. The anode-to-cathode spacing was varied to obtain the curves.

Several interesting curves were obtained which show cathodic current distribution *vs.* anode length, and distance from the cathode. In the case of the 20 in. (51 cm.) anode practically no difference in the curves is noticed on changing the anode-to-cathode spacing (Fig. 3). In the case of the 3 in. (7.6 cm.) anode, on increasing the anode-to-cathode spacing from 0.25 to 2.75 in. (6.4 to 70 mm.), the curves are slightly flattened out near the anode (Fig. 4).

These curves were obtained by building a set of probes which were insulated except where contact was made to the wire cathode. The case of the probe was made from a micarta block 1 in. x 1 in. x 6 in. (25 x 25 x 152 mm.).

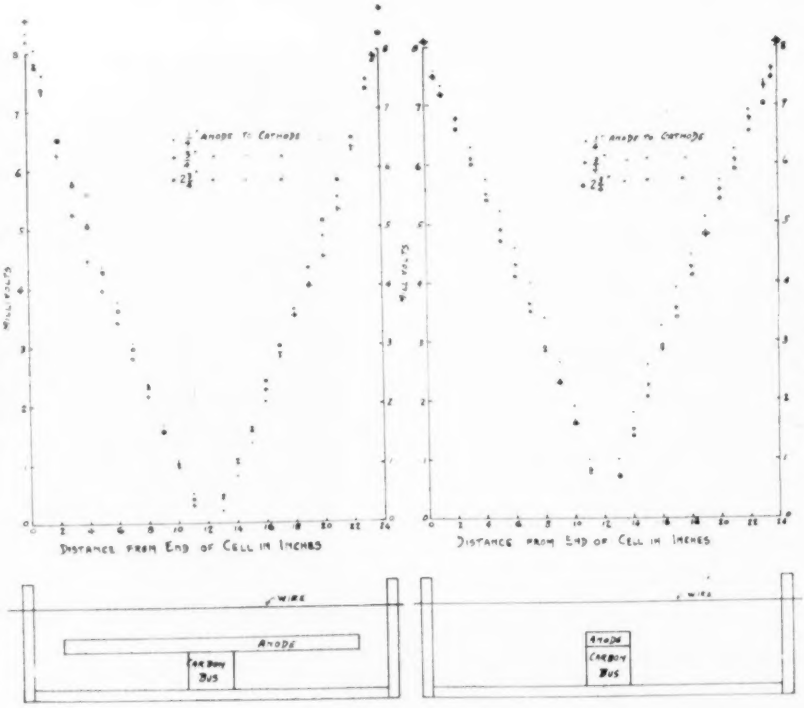

Fig. 3. Curves showing the cathodic current distribution with change in distance between anode and cathode. Anode length, 20 in. Axis of anode is parallel to axis of wire. Diameter of wire, 0.020 in. Contacts on both ends of cell. Amperes used in all tests, 2.5.

Fig. 4. Curves showing the cathodic current distribution with change in distance between anode and cathode. Anode length, 3 in. Axis of anode is parallel to axis of wire. Diameter of wire, 0.020 in. Contacts on both ends of cell. Amperes used in all tests, 2.5.

Two slots were milled in the sides of this block, and knife blades inserted in them. These blades were insulated except where they made contact to the wire cathode. A micarta plate was constructed under the knife blades so that the wire cathode could not be pushed away from good contact with the probe. A fixed current was fed into the wire and measured by means of an ammeter on each end of the cell. These instruments were used only to indicate any fluctuation in the current supply. The probe was connected to a potentiometer which was direct reading to 0.05 mv., and the cathode wire was then scanned from one end to the other. The millivolts recorded at each point were then plotted, to give the curves. In this type of curve, any change in slope indicates a change in current density at that point. When the slope becomes more vertical the current density increases, while when it becomes more horizontal the current density decreases.

The most interesting fact about the curves is that the anode length or distance from the anode to cathode has

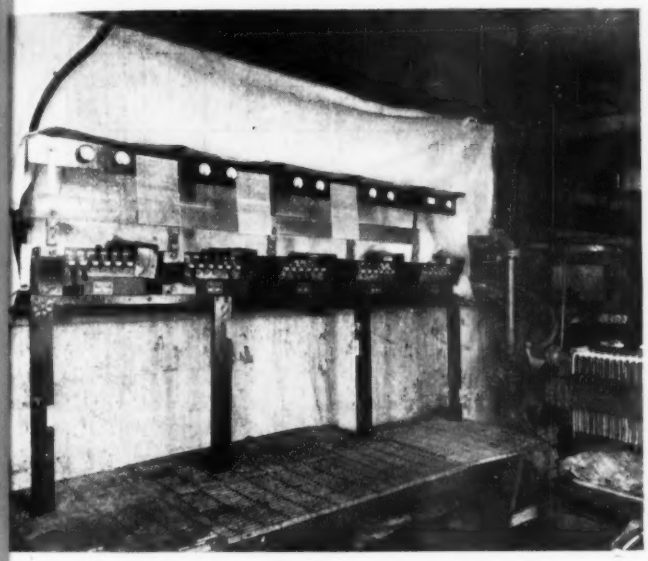

Fig. 5. Each plating cell is controlled by a tank rheostat and has its own ammeter and voltmeter to show that it is operating efficiently.

little effect on the shape of the curves. This is very important because it indicates that the upper surface of the anode pile does not need to be accurately maintained. Data were not obtained on spacings closer than 0.25 in. (6.4 mm.), as it was felt that this was the minimum distance that could be used in this design. The 2.75 in. (70 mm.) spacing was used as a maximum as it was farther away than we felt would be good operating practice in a wire line of this type. This brings up the point of cell length. The longer the cell, the greater the amount of current that must be fed to that cell. With our type of construction, that is, with contacts outside the solution, the critical factor is the heating of the wire. If the wire is heated too hot, it dries and oxidizes. This gives a wire with very poor plate adherence.

The total voltage drop due to the resistance of the wire is also important. As the current is increased, the voltage necessary to push the current through the wire is also proportionately increased. When higher voltages are required, the total efficiency of the process drops very rapidly. The contact rolls to feed power into the wire cathodes are mounted on turned points for bearings. The current is fed into these rolls by means of copper discs fastened to

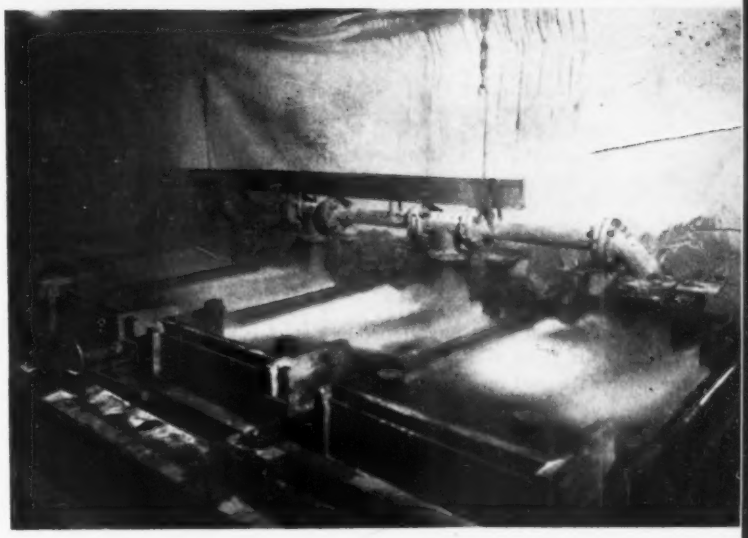

Fig. 6. Each of the five separate cells plates 1/5 the total thickness of nickel on the wire.

the rolls which rotate in a well of mercury. This type of contact has very good electrical properties, with very low friction drag.

The operating current density for 0.020 in. (0.51 mm.) diameter wire is from 300 to 500 amp./sq. ft. (32 to 54 amp./dm.^{2}) with a maximum of 1,200 to 1,500 amp./sq. ft. (130 to 160 amp./dm.^{2}). The power to operate the plating cells is obtained from a large motor generator set. The overall voltage is controlled by means of a field rheostat on the generator. Each cell has its own "tank" rheostat and ammeter and voltmeter (Fig. 5). The "tank" rheostat is used to balance each cell in the plating procedure, while the field rheostat is used to change the total plating current load from one value to another. With this type of electrical control, it is easy to keep each cell working at its peak capacity, without danger of overloading any single cell.

Electrolyte Circulation

The nickel solution is continuously pumped from the sump tank into the plating cells, by means of a large duriron pump and a lead distribution pipe. This procedure gives a very high agitation to the solution which is excellent for

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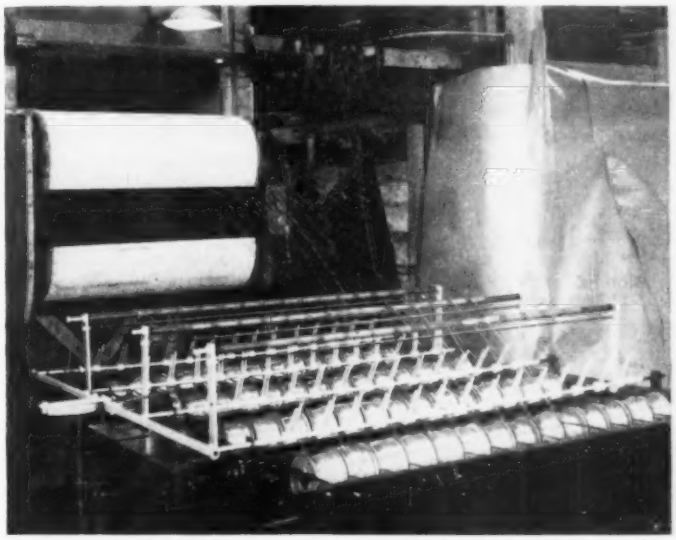

Fig. 7. View of wire passing around the tension drums and on to the spooling table, where it is wound on 5½ in. diameter spools. The tension unit pulls the wire through the line at a constant speed, while the spooling table turns the spool at the proper speed for correct winding.

High-Speed Alkaline Tin Plating[1]

By MARTIN M. STERNFELS* and FREDERICK A. LOWENHEIM**

CONCLUSION

A MATTER of great importance to platers is plating speed, that is, the thickness of deposit formed per hour. Figure 11, based upon the same data used for Figures 3, 4 and 5, illustrates this point. It will be noted that the potassium bath K 3 will give, under identical conditions, from 10-15% more deposit than the soda bath. In addition to this advantage, which is compounded by the lower voltage required for the potash bath, this bath has the further advantage that, by appropriate changes in composition, the plating speed can be increased still more, even when operating in the conventional range for soda baths. Thus, at 50 amp./sq. ft., bath K 4 has a plating speed about 20% higher than bath Na 3, and at 100 amp./sq.ft., its plating speed is 37% higher. Bath K 4, indeed, can be operated up to about 200 amp./sq ft. with only slight signs of falling off in plating speed, while bath Na 4, as mentioned above, does not exist at 194°F. Bath K 5 is even more remarkable, allowing speeds up to 0.050" per hour.

As contamination of the bath by foreign salts is always a possibility, one of us has investigated the question[1b]. In amounts from 1 to 3 oz./gal. (equivalent stoichiometrically to 1.3 oz./gal. of KCl), which are very high figures for concentration of contaminants, only nitrate, cyanide, and sulfide, out of nineteen salts tested, were harmful. Potassium nitrate markedly decreases the cathode efficiency, thus paralleling the effect of sodium nitrate in sodium stannate solutions. Cyanide gave erratic results; sulfide made it impossible to obtain satisfactory deposits. Of the most probable impurities, carbonate, from the carbon dioxide of the air, and chloride and sulfate, from pickle liquors and make-up water, have been found to be without important effect.

Small amounts of sodium are present in most commercial potassium compounds. The effect of replacing some of the potassium by sodium is to decrease, progressively, the cathode efficiency, while having little effect upon the anode efficiency. The tendency towards sludge formation is also increased as sodium ion is added to the bath.

The particular composition of a potassium stannate solution which will be chosen in any given installation depends primarily upon three factors: the ratio of anode to cathode area available, the cathode current density (or plating speed) desired, and the temperature. The second factor in turn depends upon the current and voltage available. In general, the best results can be obtained when the ratio of anode to cathode area is as high as the mechanical limitations of the set-up allow, and when the temperature is likewise as high as possible.

Since increase in tin concentration increases the cathode current efficiency markedly, and the anode efficiency slightly, and increase in free potash concentration lowers the cathode efficiency, while raising the anode efficiency, it is possible, by choosing the correct values for both constituents, to obtain a bath having any desired ratio of anode to cathode efficiency at any selected current density, or, per contra, having the same efficiencies at any chosen pair of anode and cathode current densities.

Figure 12 shows the characteristics of three potassium baths that illustrate this flexibility. For solution K 6, equality of efficiencies occurs at 25 amp./sq.ft., for solution K 7, at 45 amp./sq.ft., and for solution K 8, at 110 amp./sq.ft. On the other hand, if the anode area may be, say, 2½ times that of the cathode, then it is desirable that the efficiencies be equal when the anode current density is 0.4 that of the cathode current density. Solution K 6, operated at 40 amp./sq.ft. and 100 amp./sq.ft., respectively, satisfies these conditions, with both efficiencies above 85%. With this solution, normal plating speeds can be more than doubled without undue increase in bath concentration, if sufficient anode area is available.

Where the ratio of anode to cathode areas is about 1½ to 1, this same solution may be used at 30 amp./sq.ft. and 45 amp./sq.ft. for anode and cathode, respectively. Both efficiencies are over 95%. If a higher plating speed is desirable, solution K 7 can be operated at 60 amp./sq.ft. and 90 amp./sq.ft., with both efficiencies over 85%.

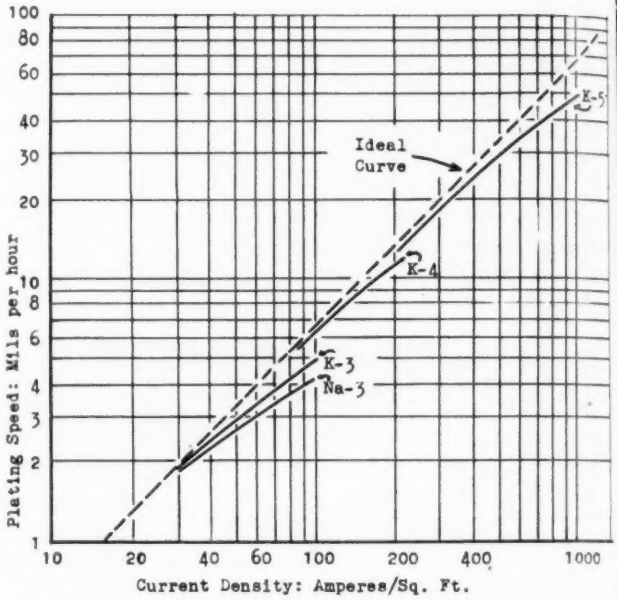

Fig. 11. Plating speeds obtainable with the sodium stannate solution (Na-3) and three typical potassium stannate solutions, K-3, K-4 and K-5, at 194° F.

Where anode and cathode areas, and hence current densities, are equal, any of the solutions may be operated at that current density where the curves cross, as noted above; if high plating speeds are required, solution K 8 will remain in balance at a higher current density than is possible with either of the other two solutions.

It is clear that other solution compositions may be chosen that will permit of almost any reasonable ratio of anode to cathode areas, with high efficiencies at high current densities.

It is worthy of note that, as the anode to cathode ratio is decreased, the bath composition necessary to achieve a given cathode current density at high efficiency becomes more and more concentrated. The advantage of providing for a high anode-to-cathode ratio thus becomes obvious. It is not as difficult to do this as may at first sight appear, because of the excellent throwing power of the bath.

Plant Experience

Installations employing the potassium stannate bath have been in operation for about two years. In one small strip-plating unit, cathode current densities of 100 amp./sq.ft. have been reached and maintained. The ratio of anode to cathode area is about 3 to 1, and solution composition is roughly tin 9.3, KOH 3.3 oz./gal. The cathode efficiency, at 190°F, is about 82%, and the anode efficiency is slightly higher as shown by the fact that the tin content rose slowly. The bath voltage varies from 6 v. at 100 amp./sq.ft. cathode density to about 4 v. at 50 amp./sq.ft. In this set-up the steel strip passes between two sets of anodes equidistant on either side of it; there is only one pass, so that the backs of the anodes are considerably further from the cathode than the fronts (anode to cathode spacing is 1.25 in. to the near face of the anodes and 2.75 in. to the far face). Nevertheless the anodes corrode quite evenly. The bath has been characterized by almost complete freedom from sludge formation.

In a larger installation for strip steel plating, the potassium stannate bath has shown advantages in lack of sludge formation and somewhat lower voltage. Due to limitations of electrical capacity the high-speed features of the bath in this case have not been fully tested. The quality of the tin plate produced on this line has compared favorably with the product of other manufacturers.

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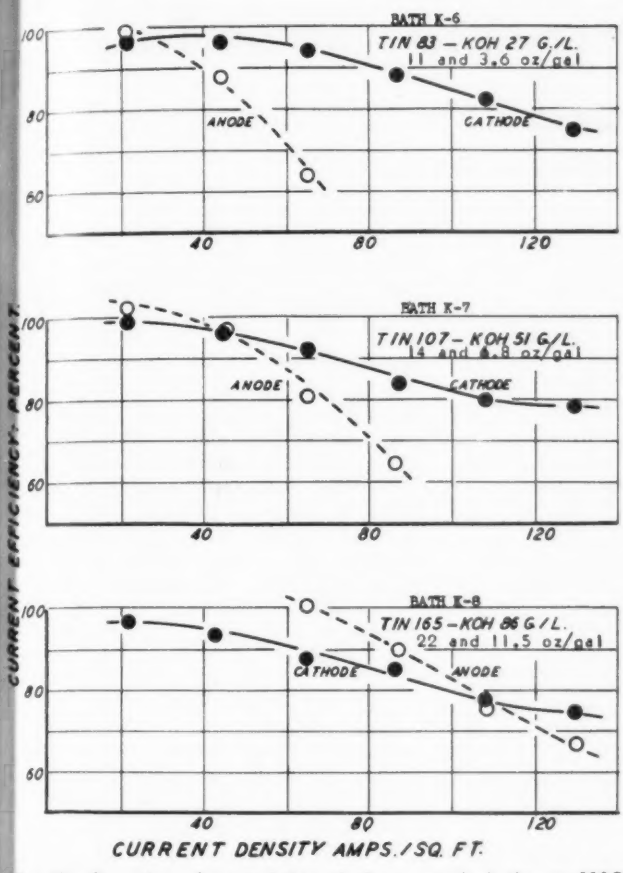

Fig. 12. Operating characteristics of three potash baths at 90°C. (194°F.)

Conclusion

The potassium stannate solution, then, promises to overcome a major objection to alkaline tin plating: the inherently slow plating speed obtainable with the sodium stannate bath. It will do all the sodium stannate bath can do, and will do it more quickly and, in general, with the expenditure of less power. It possesses other minor advantages over the sodium bath as well, including greater freedom from sludge formation, better conductivity, and more favorable solubility relationships.

Plating speeds at the extreme current densities considered in this paper are possible only with very concentrated solutions, operated in a comparatively narrow range of anode current densities. Hence, accurate control over anode current density and dragout is essential to avoid unbalanced operation and excessive loss of valuable solution. For this reason, the more extreme conditions of operation, that is, for example, the use of cathode current densities over 200 amp./sq.ft., appear to be commercially suitable only for mechanical lines or in automatic equipment where such factors can be maintained. Where these conditions cannot be met it would be far safer to limit the concentration of the solution to about 12 oz./gal. of tin, and the cathode current density to not over 100 amp./sq.ft. In this more moderate range, which still represents a two- or three-fold increase over customary procedure, dragout losses will not be too severe, and careful operation can keep them down to a reasonably low figure; in addition, accurate control of current densities at anode and cathode, though desirable, is not as vital as with the more extreme baths. There is, in short, more leeway for uncontrollable variations, without loss of the valuable characteristics of the potassium bath.

The potassium bath shares with the sodium bath the advantages of alkaline over acid solutions, including greater ease of control, better throwing power, less necessity for utmost care in cleaning, lack of need for rubber- or lead-lined equipment, and—possibly—better quality of deposit. Plating speeds have been attained with the potassium bath, in the laboratory, comparable with those from the acid solutions.

Commercial potassium stannate contains about 38% tin, and sells at prices comparable to sodium stannate. The use of potassium salts entails higher chemical costs than that of sodium salts, but the premium price is for a premium product, and the added value to the plater of a better bath is more than the price paid for it. The advantages of being able to produce more work with the same equipment and labor are of great importance. Wherever high-speed tin plating is a desideratum, the potassium stannate bath should be seriously considered.

Correction: In Table 2, February issue, under the column free KOH oz./gal. the figure for solution K5 should be 5.33 instead of 2.13.

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CONTINUOUS PLATING OF FINE STEEL WIRE

(*Concluded from page 99*)

this type of work. The high turbulent flow through the cells helps break up the anode and cathode films, which is important in high current density plating (Fig. 6). A portion of the solution is continuously circulated through a plate type filter press which keeps the solution free from dirt and impurities.

The nickel solution itself is a concentrated Watts solution run at low pH: nickel sulfate, 32 oz./gal. (240 g./L.); nickel chloride, 3 oz./gal. (22.5 g./L.); boric acid, 5 oz./gal. (37.5 g./L.). pH, 2.0 electrometric. Temperature, 140°F. (60°C.).

After nickel plating, the wire is passed through a cold water rinse, and then a hot water rinse to dry the wire. The wire then passes around the tension drums and onto the spooling table where it is wrapped on 5.5 in. (140 mm.) diameter spools. The tension unit pulls the wire through the plating line at a constant speed, while the spooling table turns the spools at the proper speed for correct spooling. The table carries four rows of fourteen spools (Fig. 7). The wire is wound evenly on the spools by means of a specially designed heart-shaped cam. This type of cam may be designed to give any shaped contour desired in the finished spool of wire. The speed of the spooling table and camshaft are synchronized with the tension unit to keep the whole coiling unit and tension unit in perfect balance.

The line has an average daily output of over 1,000,000 ft. (300,000 m.), of precision-plated wire which shows that the design of a straight horizontal path for the wire was an excellent solution to this production problem.

A Simple Automatic Level Control for Plating Tanks

By JOSEPH B. KUSHNER

Metal Finishing Consultant, New York City

THE trend during the past few years has been towards more and more automatic control in electroplating operations. This has been brought on not only by reason of the critical war manpower shortage but because plant management and the plater himself has realized that there are certain operations in the plating room that can most advantageously be handled automatically. In essence, the idea is to save time and energy and to make plating operations as "fool proof" as possible.

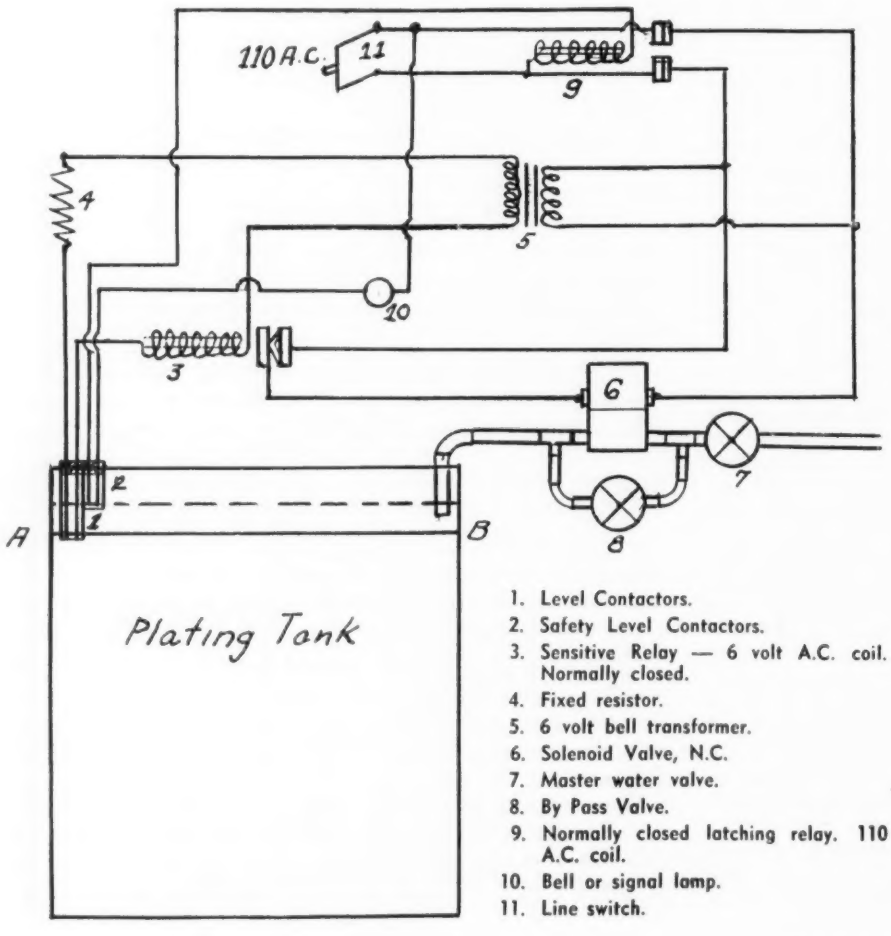
The swing in this direction was already well established in many large plating plants when we entered the war but since Pearl Harbor it has spread to smaller plating rooms using semi-automatic and manual plating systems, where the emphasis is on getting out war materiel with a minimum amount of rejects and a maximum amount of efficiency. It can safely be predicted that many remarkable developments along this line will see the light of day in the near future.

In connection with automatic control the simple liquid level controller for plating and cleaning tanks described here, may be of interest. Nothing new or original is claimed for it, only that it has proved of value in a number of installations, particularly in gold plating work, but it is just as readily useful wherever warm or hot solutions are employed for plating or cleaning. It will help save precious manpower hours and may eliminate some of the little headaches in plating that sometimes add up to a big one.

Originally, the idea was conceived to help gold platers get more uniform results. Gold plating solutions are usually operated at temperatures ranging from 120°F. to boiling and the rate of evaporation is fairly high, particularly where there is no thermostatic control of temperature; said temperature being controlled by an occasional glance at a thermometer or by sheer guesswork. As a result of water evaporation, salts in the bath can be concentrated to such values as will markedly affect the conductivity of the solutions and bring about a change in the color of the deposits, especially where no attention is paid to current density, and line voltage is the sole criterion of control. In the small plating room with the usual crush of work present, evaporated water is spasmodically replenished and the liquid level may vary by as much as 20% or more, plus or minus, from the supposedly correct operating level. As can well be expected, this tends to bring about color variations in batch runs.

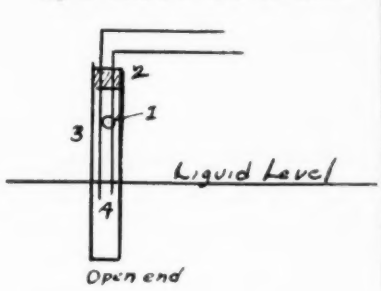
In designing a level control, simplicity was the paramount thought. Since plating tanks are open at the top and frothing and excessive turbulence are not commonplace, it was decided that ordinary electrical control would suffice in preference to a more complicated electronic control. Accordingly, the circuit shown in Fig. 1 was tried and found quite satisfactory.

Fig. 1. Schematic Diagram of Level Control.



1. Level Contactors.
2. Safety Level Contactors.
3. Sensitive Relay — 6 volt A.C. coil. Normally closed.
4. Fixed resistor.
5. 6 volt bell transformer.
6. Solenoid Valve, N.C.
7. Master water valve.
8. By Pass Valve.
9. Normally closed latching relay. 110 A.C. coil.
10. Bell or signal lamp.
11. Line switch.

Fig. 2. Details of Level Contactors.



1. Vent hole.
2. Seal (Insulating).
3. Pyrex glass tube.
4. Bared platinum or stainless steel wires.

The principle of operation is quite simple. When the master switch is turned on, a very low voltage is fed through the bell transformer and the resistor to the stainless steel (or platinum) wire level contactors (Fig. 2) situated at the proper and fixed operating liquid level (AB). If the electrolyte is at this level or slightly above it, the sensitive relay is actuated by the low voltage A.C. current passing through the electrolyte. This in turn, keeps the circuit of the solenoid open so no current passes to the solenoid valve. It remains closed and no replenishing water enters the tank. As the electrolyte evaporates in the plating tank, the liquid level drops slightly and the sensitive relay circuit opens because no current can flow through it. This permits the sensitive relay contacts to come together and thus closes the solenoid circuit, which in turn opens the solenoid valve. Water now enters the plating tank through the valve until the proper fixed level is reached whereupon the sensitive relay is energized again and the solenoid valve is closed.

By bleeding a slight amount of water through the by-pass during actual plating operations, the system can be adjusted so that the relay does not "chatter." In practice this step is not necessary inasmuch as the master valve can be adjusted to give a slight overflow and thus a sufficient time lag to

(*Concluded on page* 106)

Metallizing Non-Conductors

By SAMUEL WEIN

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CONCLUSION

Metallic Paints

THE following processes coming within this group are those:

(1) In which a metallic salt is dissolved in an "essential oil" and applied to the given surface such as glass, ceramic, mica, etc., and subjected to elevated temperature whereupon the metallic paint is reduced to metal and fused into the insulating material.

(2) Wherein a metal powder or a metallic salt is mixed with a suitable flux and an essential oil, applied to the given surface and subjected to an increase in temperature, fusing it to the given material.

(3) In which the metal powder is mixed into a suitable lacquer medium, applied to the given surface and fused thereto at elevated temperature.

(4) The materials forming a part of the porcelain is used as a medium into which may be incorporated the metal salt or metal powder, and formed into the given item, such as a vase, etc., and this is then "fired" in the kiln. When cool the metal will be seen to be an integral and homogenous mass throughout the porcelain.

The procedure is a simple one, and the metallic film is one to which other metals may be soldered.

Silver: Silver is being used quite extensively, especially for glass decorating, thanks to its beautiful color. It has, however, the disadvantage of tarnishing readily, which somewhat limits its use. A fired base of silver is indispensable as a subcoating on which silver is electrolytically deposited. Other uses for silver films are electrical contacts and for condensers.

Gold: There are two kinds of ceramic gold. By far the greater part of all gold decorations is done with bright gold which comes from the kiln with the true gold color as a brilliant metallic mirror and requires no polishing or buffing, provided it is applied on a lustrous or glassy surface; on dull or etched surfaces it appears less glossy. The bright gold contains 11% fine gold, also in higher grades which are used for the better kind of merchandise.

Platinum and Palladium: Platinum, like gold, is obtainable in a bright color, but government restriction is the prohibiting consideration. Palladium has found a limited use as a substitute for platinum because of its lower cost, but has never been popular.

Ruthenium: Has been used experimentally for medical and dental purposes, but, because it was very costly and because it was not commercially available, did not receive the attention it should have had.

Platinum

Man suggests plating platinized glass or porcelain so as to permit of soldering metal thereto. In this connection see references to Kundt and Kohlrausch.

Cailletet described a joint between glass and metal tubing made by covering platinized glass with a film of copper electrolytically deposited thereon and soldering it to the metal tube as if it were metal. This joint was used by him for the liquifaction of glasses and held 300 atmospheres internal pressure.

Koenig has used a joint somewhat similar to the Cailletet joint to join a glass manometer to a steel osmotic pressure cell. The glass tube was roughened by rubbing with glycerol and emery dust. It was then platinized by painting on a mixture of about 2 parts of ether to 1 part of alcohol containing 3% of platinic chloride and 2% stearic acid. After drying, the coated glass was gently heated in a Bunsen burner until a platinum coating was obtained. The platinum film was first plated with gold and then with nickel. A strip of zinc foil was wound around the nickel and soldered into place. This tube was then soldered to the steel cell.

Roentgen, the discoverer of X-rays, soldered a sheet of metal to a piece of glass, several square centimeters in area which had previously been platinized by the methods described in the first of the series in this group. The soldered metal piece was observed to cling tenaciously to the platinized surface.

The method used by Drayton consisted of:

Silver nitrate	1 oz.
Spirit of hartshorn	½ "
Water	2 "

The mixture is thoroughly mixed and preferably ground, avoiding lumps or coarseness. This is now filtered and to the mass is added:

Alcohol	3 oz.
Oil of cassia	20-30 drops

To the foregoing there is now added:

Oil of cloves	6 to 12 drops

A modification according to Angenard is to dissolve platinic chloride in oil of flowers of lavender to which a small quantity of asphaltum is added. This "paint" is applied to the glass surface and fused at a cherry color. Another method accredited to Angenard is to dissolve platinic chloride in spirit of ether, allowing the solvent to evaporate, thereafter it is redissolved in oil of lavender which can be applied to the given surface. Oil of turpentine may be used in the place of lavender oil. Alcohol may be used in the place of ether as the solvent of the platinic chloride.

A 10% platinic chloride solution equivalent to 1 gram of platinum chloride is evaporated to dryness in a porcelain evaporating dish, and dissolved in a minimum quantity of absolute alcohol. This solution is added very slowly with stirring to 6cc. of lavender oil in a container cooled in ice. Burgundy pitch is added to the warmed solution until the latter has the desired consistency, according Newton. A most interesting paper on the subject was prepared by McKelvey and Taylor.

One part of pure neutral platinic chloride, prepared by evaporating the 10% solution to dryness is moistened with a few drops of absolute alcohol and ground finely in an iced mortar with 10 parts of lavender oil, adding the latter gradually in small portions.

Ascribed to Kundt and Kohlrausch, 1 gram of platinic chloride is dissolved in 3.5 cc. absolute alcohol, 10 cc. of a concentrated alcoholic solution of boric acid is added and the whole is treated with 25 cc. of a mixture of lavender oil and Venetian turpentine in proportions to give the desired consistency.

Platinizing solutions which have been kept for several years gradually thicken when exposed to the air but deposit no platinum, and can still be used with satisfactory results.

Pour some oil of rosemary over platinum chloride in a small porcelain mortar and knead it with a pestle, renewing the oil about three times. Continue this operation until there is produced from the brownish-red chloride a black plastic mass wherein no particles of undecomposed platinum chloride can be found. Pour off the excess oil of rosemary, rub it up well with the pestle, and add about 5 times its weight of oil of lavender until it has become a perfectly homogenous, thin fluid. Allow it to stand for half an hour; apply this to the surface in a thin layer. Place this in the kiln or over a burner at a low heat and for a few minutes at a red heat. Prepare enough for use at a time, as it does not keep.

A number of modifications in the preparation of these platinum films have been proposed. Practically every method is some variation of the original method already outlined, and, in this connection, the earnest worker is referred to the efforts of Basserot and Dode.

Dode's metallic paint contains a flux, and is made up of:

Litharge	2 grams
Lead borate	1 "
Lavender oil	10 "

These materials are finely ground and enough platinic chloride is added to form a thin paste-like paint, which is applied to the surface and fused thereto.

Rheinberg dissolves collodion in methyl alcohol and adds to it a solution of platinum, palladium or iridium salt, as in the case of a chloride, applying this solution to the glass or ceramic surface and subjecting it to tem-

peratures between 500° and 750°C.; this depending, of course, on the kind of glass used. An addition agent of bismuth chloride or lead sulphate is recommended. A typical formulation recommended is made up of:

6% collodion	3 parts
12% platinic chloride	3 "
Ethyl alcohol	3 "
1% bismuth chloride	1 "

The platinized surface mirrors are perfectly transparent and have a neutral gray tint.

Paische washes glass with a solution of iron or copper sulphate containing a little ochre or whiting, the recommended proportions being:

Copper sulphate	1 part
Ochre	2 "

The glass is now heated to 750°F. and treated with:

Platinic chloride	50 grams
Litharge	1 "
Lead borate	1 "

Lavender oil is added to form a thin paint, ground to a fine form, and it is ready for application to the glass, when it is fired at 1000°F.

Ruthenium, Iridium, Palladium, Rhodium

Rosenblatt forms mirrors of metallic ruthenium on glass, ceramics, quartz, etc., by using 1 gram sodium ruthenium nitrite in a small amount of water and 1 gram of alpha naphthol, 6 cc. of ortho-toluidine and 4 cc. of acetic acid. This mixture is heated on a water bath, benzol is added, and the mixture is shaken and then separated in a "separatory funnel." The benzol solution, containing the reaction compound, is washed with water and dried with potassium carbonate, after which it is then filtered.

A modification of the foregoing is made up of 1 gram ruthenium nitroso chloride and 1 gram of alpha naphthol, which are dissolved and boiled in acetic acid; the solution is finally evaporated, giving a resinous mass which is soluble in isoamyl alcohol, acetic acid, oil of lavender, etc.

Such solutions are applied to the cleaned surface and allowed to dry, then subjected to temperatures between 350° to 400°C.

A third modification may be made up of 5 grams ruthenium nitroso bromide in 50 cc. of propyl alcohol and 50 cc. methyl-isobuytl alcohol, to which is added 1 cc. phosphoric acid.

It is important to remember that these metallic mirrors are not affected by acids or alkalies and are recommended for dental as well as medical uses.

Similar procedures are employed for the production of films of iridium, palladium and rhodium, using the appropriate metal compound.

Silver

Ballantine and Painter suggest:

Silver powder	2 parts
Glaze	1 "

The glaze consists of lead borate or sodium boro-silicate. Newton, working with this formulation, suggests it be mixed with lavender oil, using enough to make an easy flowing paint. Apply to the glass surface, allow it to dry and fire in a muffle furnace. Scratch brush and plate.

Pottier was the first to use metallic silver and a flux for this purpose. The formula he used consisted of:

Silver	75 parts
Lead borate	25 "

These are ground together in a paint mill with a little essence of turpentine and neat's foot oil. This compound is applied to the surface and fired in a kiln.

The following formulas have all been tried and found to give good results. The fourth formula is that accredited to LeForte:

Formula 1

Silver chloride (fused)	2 oz.
Lead acetate	1 dwt.
Soda ash	1 "
Potassium nitrate	¼ "
Boric acid	¼ "
Borax	¼ "

Formula 2

Silver chloride	1 oz.
Lead borate	2 dwt.
Potassium nitrate	2 "
Borax	1 "

Formula 3

Flint glass (powdered)	6 grams
Lead oxide	6 "
Potassium nitrate	24 "
Borax	6 "
Boric acid	12 "
Silver chloride	1 oz.

Formula 4

Silver chloride	4 ozs.
Boric acid	4 dwt.
Potassium nitrate	4 "
Flint (powdered)	4 "
Glass (powdered)	4 "
Soda ash	4 "
Lead oxide	4 "
Borax (calcined)	8 "

Ernst heats glass to 600°C. and sprays it with:

Silver oxide	0.60%
Lead borate flux	0.11%
Rosin G gum	32.62%
Copiaba balsam	10.00%
Turpentine	56.67%

A modification given by Ernst is made up of:

Water	67.2%
Cane sugar	16.8%
Silver nitrate	13.5%
Lead acetate	2.5%

Glycerine, gum arabic or gum tragacanth can be used in the place of sugar.

The lead borate flux is made by fusing the following at about 500°C. in an oxidizing atmosphere:

Red lead	71 grams
Boric acid	29 "
Ammonium nitrate	3 "

Dimes recommends the following:

Silver	1 oz.
Mercuric oxide	1 dwt.

The mixed materials are ground in turpentine and then mixed with Dresden fat and oil and turpentine, after which it is ready for use.

Smith found that if barium fluoride is added to lead borate or barium borate it will produce a much stronger bond than the lead fluoride as before described. A typical compound consists of:

Powdered silver	65 %
Lead borate	3.5%
Bismuth subnitrate	1.5%
Lavender oil	30 %

To the foregoing compound there is added about 10% of fluorides of barium or lead.

Smith forms a lead borate glaze to which metallic silver powder has been added together with a vehicle such as lavender oil. Better fluxing is obtained if 10% lead fluoride is incorporated. This compound is applied to the glass and fired at 600°C. for a few minutes.

Marino forms a saturated solution of 140 parts of potassium cyanide in water, then a solution of:

Ammonium fluoride	60 parts
Silver chloride	100 "

Next is prepared a reducing solution made up of 100 parts hydrazine sulphate in sufficient water to form a saturated solution, adding to this solution 60 parts of caustic soda or sodium carbonate.

The modus operandi is to first apply to the glass or similar surface a mixture of 1 part sodium silicate (sp. gr. 1.27) to 2 parts of water. Thereafter apply a mixture of 1 part sodium silicate to 1 part of water.

Subsequently there is applied the silver solution, this having been done there is now applied the reducing or hydrazine solution.

Marino also treats glass, ceramics, etc., with a solution of silver fluoride, and then exposes it to the action of a stream of coal gas, subsequently submitting it to a second operation which consists in heating the article to about 50°C. and exposing it to a stream of carbon disulphide vapors, reducing the metallic salt to a metallic state with better conductivity and ease of plating. The carbon disulphide actually converts the silver fluoride to silver sulphide. Better adhesion of the film can be effected by brushing the deposited film with a brass, zinc or copper circular wire brush.

He also adds cuprous oxide to a solution of silver nitrate, forming a precipitate which is then dissolved in hydrofluoric acid, and this is applied with a brush to the roughened surface. In order to insure its adhesion to the applied surface, the copper and silver are reduced while met with a mixture of copper and zinc powders, or powdered copper with either iron, nickel, cobalt, cadmium, lead or bismuth. This surface is now brushed briskly to produce a polish, which gives it a better conductivity, and this latter surface may now be plated.

Gold

Many workers have experienced great difficulty in securing an even deposit, this being due to the coarseness of the metal. Hasburg overcomes this coarseness by the following procedure: A gold chloride solution

is prepared; to this is added an excess quantity of potassium hydroxide solution. A precipitate will form; on the addition of an excess of the alkali, the precipitate will redissolve. To this is added a solution of mercurous nitrate until no further precipitate forms. The precipitate is separated from the solution and washed and then treated with an excess of nitric acid (to dissolve the mercurous salts formed in the precipitate) and thoroughly washed in running water. By this method the gold is left in an extremely fine, amorphous condition. It is dried and is ready for use.

Hansen dissolves sulphur in oil of spike (Lavendula spica) and gold or platinic chloride is dissolved in sulphuric ether. The two solutions are mixed, applied to the given surface, and fused into the glass, china or vitreous surface.

Heller forms a gold-graphite compound using the following two solutions:

Gold protochloride	3 grams
Water	500 "
Potassium cyanide	10 "

To the foregoing there is added:

Graphite	1 kilogram

This mixture may be fused to the work at 600°C.

Gold may be used instead of silver for deposition; this may be readily done by dissolving it in aqua regia, which consists of 1 part nitric acid to 3 parts hydrochloric acid. Great care must be exercised in handling this solution, as the fumes arising are extremely poisonous.

Metallic gold must be precipitated from this solution. To do this, divide the solution equally and pour into four tumblers. To each add twice its bulk of distilled water. Dissolve some ferrous sulphate in hot water and add it to the gold solution until a precipitation takes place. The gold will be found at the bottom of the tumbler in the form of a brown powder, which, when it has been dried and has had the necessary amount of flux added, is ready for use. In pouring off the original solution there will be found a slight residue of an alloy which may be left in the tumbler. When the precipitate of gold has been completely extracted, the water may be poured off and the brown powder collected and dried. When dried, it should be passed through a fine sieve or a piece of muslin.

Another gold compound is made up of:

Flux:	Bismuth nitrate	12 parts
	Borax	1 "

Of this take:

Flux (as above)	1 part
Gold	12 "

Tomlinson refers to the use of platinic chloride (as well as the chlorides of gold, silver and copper) with a sufficient amount of oil of rosemary and this is kneaded to form a paste-like consistency to which is now added about 5 times its weight of oil of lavender, this being applied to the given surface and fused in at 900°F.

The following formula is used to advantage in Europe:

Silver chloride	1 oz.
Gold	5 dwt.
Bismuth nitrate	40 gr.
Borax	18 "
Glass (powdered)	1 dwt.

Heller and Baumgartle produced a compound they called "Tombac", and this is made up of:

Copper	3 parts
Zinc	1 "
Gold	⅛ "

Of this Tombac, use is made of:

Enamel	2 parts
Borax (calcined)	1 "
Tombac	1 "

Laybourn adds plumbago to a clay mixture, molds this under pressure and subsequently fires it at elevated temperatures (1500°F.) for 48 to 54 hours. It is allowed to cool gradually and is then ready to be plated. Blower adds metallic powder to a clay mixture.

Firing

After the metallic paints have been properly formulated and applied by skilled decorators as in the case of geometric designs or figures, the articles are placed in the kilns for "firing." The kilns are charged with as much ware as they will hold and then gradually heated up to the desired temperature which is controlled by suitable pyrometric equipment. When the peak temperature is reached, the heat is shut off and the kiln allowed to cool, whereupon the decorated ware is drawn out and the process repeated with a new batch of ware.

There are two types of kilns used, they are (1) periodic and (2) tunnel forms. Periodic kilns are nowadays in use only in the smaller establishments while for large production the tunnel kiln or lehr has almost entirely replaced the old time upright kiln which was such a familiar sight in pottery towns.

The tunnel kiln has derived its name from the shape of the firing chamber which is many times as long as it is wide or high. The decorated pieces are placed on a conveyor belt on which they travel slowly through the kiln, entering it at the cold end and gradually proceeding into the hotter regions until they reach the top heat in the center of the tunnel. From there the heat decreases again and finally the finished articles arrive at the other end where they have become sufficiently cool to be handled and either packed for shipment or to be sent back to the decorating room for burnishing or additional decoration. The temperature at which ceramic metal decorations mature depends on the kind of ware to which they are applied and ranges from 900°F. for soft glass to 1650°F. for terra-cotta. Specimens of all types of ceramic and glass articles decorated with gold, platinum, and silver may be seen in many of the larger department stores and in gift shops.

Plating

The Silver Dip: Before plating, it is often desirable to increase the electrical conductivity of those films containing copper or bronze powder. The process consists of giving it a "silver strike" merely by placing it in a solution made up of:

Sodium cyanide	3 ozs.
Silver cyanide	1¼ "
Water	1 qt.

After one or more dippings of the item in this solution, it is given a slight rinse in cold water, and then transferred to the acid copper bath.

A modified formulation consists of:

Sodium cyanide	3½ ozs.
Silver nitrate	3 "
Water	1 gal.

The solution should be clear, and, if not, can be cleared up by the addition of a little sodium cyanide. There should be, however, as little as possible of free cyanide in the solution.

A third silver strike is made up of:

Silver nitrate	1½ ozs.
Water	2 "
Ammonia	1 "
Alcohol	2 "

These silver strike solutions serve as a means of visible indication of "bare spots" in the so-called bronzing process.

Oxidizing: Graphited surfaces may be made more conducting (electrical) before they are copper plated, by means of a preliminary treatment termed "oxidizing." This process is a very simple one, and consists in placing the graphited object in a shallow trough containing:

Copper sulphate	10 ozs.
Water	1 gal.

and sprinkling on the surface fine iron filings. A copper film will be seen to be deposited over the entire surface which is washed with running water, and is then ready for plating with the acid copper plating bath.

The use of iron powder as an "oxidizing means," such as was just described, is accredited to Knight. In electrotyping practice, the iron filings are sprinkled over the graphited surface, or "case," using a large salt or flour shaker. The copper sulfate solution is then poured over the surface.

The Acid Copper Plating Bath: Experience has taught that an acid copper sulphate bath gives the most consistent results for depositing a thin or thick copper film on top of the silvered or other metallic film deposited on the insulating material. Such solutions are simple to prepare, and they are inexpensive as well, requiring little control in maintaining their proper functioning.

Acid copper sulphate baths are made up by dissolving copper sulphate in water and adding to it a small amount of sulphuric acid. The concentrations of copper sulphate and sulphuric acid varies with almost every worker, but in general the following proportions are considered to be best suited for all around plating work.

Copper sulphate	20 to 33 ozs.
Sulphuric acid	6 to 13 "
Water	1 gal.

In order to increase the efficiency of the plating bath, it is suggested that the solution be agitated by blowing compressed air through it.

The current density is usually between 30 and 125 amperes per square foot of area to be plated and at 6 volts maximum.

The distance between the anode and cathode should not be more than 4 inches.

The temperature of the plating bath should by preference be that of the room, and avoiding an increase or decrease in temperature, as otherwise the grain size of the deposited copper will be materially affected. (Elevated temperatures and more concentrated solutions are commonly used today, however.)

Laux patented such a solution, having a pH of 1.1 to 0.9.

Addition Agents: When baths containing copper sulphate and sulphuric acid are operated under the above conditions, the deposits are usually somewhat rough and relatively soft. As previously stated, slight roughness is not objectionable. It is usually desirable, however, to produce copper that is as hard as can be deposited without being brittle. Certain *addition agents* have been found to be beneficial for this purpose.

It has long been known that when certain materials are added to baths used in metal deposition, the deposits are smoother and harder. Especially in copper deposition, a large number of addition agents have been proposed, although a few of them have come into extensive use.

The addition agent that has been found to be most satisfactory is phenolsulphonic acid, and is the result of work done by Hull and Blum. This compound is produced by treating conc. phenol (carbolic acid) with an equal volume of conc. sulphuric acid. The mixture may be allowed to stand at ordinary temperature for about 48 hours; or the reaction may be hastened by heating the mixture to 100°C. for about 1 hour. A convenient quantity of the reagent can be prepared by pouring 2 quarts (4 lbs.) of phenol into an eartherware, lead or copper vessel, slowly adding 2 quarts (7.5 lbs.) of conc. sulphuric acid, and mixing thoroughly.

After the mixture has stood for 48 hours, or has been heated for 1 hour and allowed to cool, about 2 quarts of water are added to make the solution less viscous. Each pint of this mixture is equivalent to about 5 avoirdupois ounces of phenol.

It was found that the best concentration of phenolsulphonic acid is that equivalent to about 0.13 ozs. to the gallon or 1 g./L. of phenol. For a bath containing 250 gallons this is equivalent to 32 ozs. of phenol, or about 6 pints (3 qts.) to the above mixture. The maximum effect of the initial addition is not observed for a few days, by which time the solution has acquired a deep green color.

Gelatin and glue are commonly used as addition agents, since they are more readily obtainable. Very small quantities are employed, in the neighborhood of 2 oz. per hundred gallons, an excess resulting in a brittle deposit.

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A SIMPLE AUTOMATIC LEVEL CONTROL FOR PLATING TANKS

(Concluded from page 102)

completely eliminate "chattering." The bypass is then used only if for any reason manual conntrol is desired.

The safety overflow contacts and relay while not essential, are advisable if the plating operations are of such a type that no operator is near the tank for long periods of time. Should by some unforeseen accident, the sensitive relay circuit be opened, the solenoid will be opened and water will flow into the tank. The moment the liquid level reaches the "safety contacts," the safety latch relay is actuated, which in turn closes the solenoid valve and sounds a warning signal to tell the operator something has gone wrong. Actually, with a correct wiring job and a good sensitive relay such a happening is well nigh impossible since any failure of the main power line closes the solenoid valve as well; nevertheless the extra safety feature does no harm.

Because an alternating current is used between the liquid level contactors, no metal is plated out on the wires, water being in all probability, the only substance decomposed. If there is any decomposition, it is negligible because of the very low current (at 6 volts about 20-30 milliamps) used to energize the sensitive relay. As a matter of fact it is quite probable that a more rugged relay, drawing a little larger current can be employed without harming the plating or cleaning solution in any way. The whole set up can be compactly mounted behind a panel or in a ventilated box away from heat, moisture and fumes.

While solenoid valves are made to control lines down to ¼" IPS, the smallest solenoid valves readily available commercially are usually for ½" IPS, so two reducing bushings will be required with the valve if a ⅜" or smaller line is used for supplying water. It will be found that Saran plastic pipe and tubing are excellent for carrying distilled water into the plating tank, if distilled water is used in replenishing. Saran is readily available, will supplant much more difficult to get metal pipe and is easy to work with. If ordinary tap water is used, iron pipe will serve.

In operation, the plater, at the start of the working day, opens the master water valve, adjusts it, and flicks the master switch. The automatic controller now takes over. He does not have to monkey around with a hose, faucet or valves from then on, or run back and forth with a bucket of water for replenishing every hour or so. He can work with a calm mind knowing that his plating solution is operating continuously at the proper concentration and that chemical analyses and additions will be correct (if made properly, of course!) because the volume is maintained at constant level. If the tanks are kept warm overnight to facilitate rapid starting in the morning, the level controllers can be safely kept on also, thus insuring plating baths ready for action immediately and eliminating the nuisance of having to make water additions to the baths and then wait for the baths to come up to temperature again.

The system can be applied to any hot cleaning or plating tank from one gallon up. The first cost will be between $25 and $35 per tank and the operating cost per unit is about ½ cent per day, based on an average price of electricity of 5 cents per kilowatt hour. In view of the advantages obtained by its use and the time consuming operations it eliminates, the automatic tank level controller, if adopted, in a plating room, will soon pay for itself many times over.

THIS IS WASHINGTON—

By George W. Grupp
METAL FINISHING's Washington Correspondent

Baltimore-Washington Branch Meeting a Great Success The annual dinner and meeting of the Baltimore-Washington Branch of the A. E. S., held at the Maryland Yacht Club, Baltimore, Md., on February 3, 1945, made history. The educational meeting was well attended to hear Dr. Walter R. Meyer, Dr. Frank C. Mathers, and Mr. Adolph Bregman present papers on topics both timely and informative. During the educational session the wives and sweethearts of the members engaged in a lively game of bridge with Mrs. Wendell P. Barrows taking first prize. Eight of the charter members who gathered at the first meeting of the Branch in the Emerson Hotel, Baltimore, Md., in May, 1928, Wendell P. Barrows, Dr. William Blum, William Chase, Matthew J. Kraft, Arthur Pierdon, Fred Pierdon, Thomas Slattery, and Armand Tschantre, were greeted with rounds of applause by the over 160 who turned out to enjoy a good dinner, to sing to their hearts content with Clarence Stapleton at the piano, to exercise their terpsichorean ability to the tunes of Roby's Orchestra, and to fill the dining room with gales of

Charter Members and Branch Officers present at the 17th Annual Educational Session of the Baltimore-Washington Branch of the American Electroplaters' Society held at the Maryland Yacht Club, Baltimore, Maryland, on Saturday, February 3, 1945. ***Front Row:*** **Ken Huston, Irvin Hahn, William Chase.** ***Middle Row:*** **Tom Slattery, Wendell Barrows, Matt Kraft, Fred Pierdon, Armand Tschantre.** ***Rear Row:*** **William Blum, Abner Brenner, Arthur Pierdon, Walter Olson, Ray Stricklen, Jr.**

laughter provoked by an exceptionally good entertainment program of impersonations, legerdemain, singing, Spanish dancing, and ventriloquism put on by professionals and a few members of the Branch including William Bresnick, Matthew J. Kraft, and Thomas Slattery. President Kenneth M. Huston, Banquet Committee Chairman Frank Davey, Librarian Walter Olson, Raymond Stricklin, Jr., Harry C. Irvin, and the hostesses for the ladies, Mrs. W. P. Barrows, Mrs. K. M. Huston, Mrs. A. G. Pierdon, and Mrs. L. G. Tubbs, cooperated as a great team and, as a result, the annual meeting was the greatest success in the history of the Branch.

Dr. Meyer Talks on Chemical Coloring Dr. Meyer opened the educational session by presenting a paper on "Chemical Coloring of Copper and Aluminum Alloys." He began his paper by reviewing some of the results of coloring on aluminum and then hinted that in the future it will be used for decorative purposes on a greater scale than ever before. In speaking of removing dirt he said that no particular type of etch is preferable provided it does not form insoluble soaps. He pointed out that smut removal is always a problem. He warned that the immersion time and condition of the copper and nickel plating must be watched very closely. He briefly described his recent patent on a proces to blacken copper. In concluding his talk he predicted that after the war copper oxides would be preferred to copper sulfides because more satisfactory colors are obtained from the former.

Bath Compositions Discussed By Dr. Mathers Illustrated with about 50 lantern slides and a large number of samples, Dr. Frank C. Mathers, Professor of Chemistry, Indiana University, delivered a paper on "The Effect of Composition of Baths on the Deposit." In introducing his subject to the members he said that "less is known about water solutions than about the solutions with other liquids because of the great complexity and unusual properties of water and its solutions." He pointed out that "complex cations containing acid radicals, water, addition agents, conducting salts, along with the metal itself, are deposited at the cathode." He said that glue is worthless in a lead acetate bath; that glue and creosol are the best additions for tin deposits; and that better lead deposits are obtained from lead fluoborate baths.

Bregman Speaks on Metal Finishing Costs Mr. Adolph Bregman, Consultant of New York City, presented a paper on "Metal Finishing Costs." Before discussing some of the elements of costing he told how some years ago the Masters' Electroplating Association of New York, a trade association of job platers and metal finishers, developed methods of estimating electroplating costs. At each meeting samples of work were exhibited. Each one was given an opportunity to estimate how much it should cost to do that work. The results were then placed on a blackboard for critical analysis by the members present. In some of the estimates the difference between the lowest and highest bidder was sometimes 500 per cent. After each member told how he determined his figure everyone present learned something of value. He pointed out the causes for differences in cost estimating, and the difficulty of estimating the unforeseen. He warned that different methods should be used in estimating costs for still plating and barrel plating. And he concluded his talk by hinting that the Office of Price Administration may write a price ceiling formula in OPA Regulation 136. In commenting on this he referred to the difficulty in placing a ceiling on job plating work.

Priorities Regulation No. 24 Amended On January 26, 1945, the War Production Board rendered inoperative the provisions of Priorities Regulation No. 24 that permitted the placement of unrated or non-authorized orders for certain types of capital goods such as electroplating and anodizing equipment. This action was taken to prevent interference with the use of manpower, facilities and materials urgently needed for war production. To accomplish this objective all WPB orders such as L-123 appearing in List A were eliminated. With this change all unrated or non-authorized purchase orders already placed but not shipped cannot be delivered unless proper rating and authorization is obtained or unless the particular WPB order is amended to allow such

delivery. Unrated or non-authorized purchase orders for such capital goods as electroplating and anodizing equipment may be retained on the books, but they must be treated as orders scheduled for delivery when applicable restrictions are modified to permit delivery. Manufacturers who are now producing or have planned to produce in the future on unrated or non-authorized purchase orders under the provisions of PR 24 will be expected to cut back any purchase orders they have placed for components, parts and materials to conform to applicable WPB inventory regulations. To put some of this another way: all unrated orders are void; orders rated AA-5 on GA-1977 under PR 24 are invalid; no unrated or AA-5 order can be shipped without authorization; and applications for authorization to delivery equipment not for war purposes should be made on form WPB-1399 by the customer under paragraph (g) of PR 24. If the amended PR 24 is a special hardship an appeal should be immediately made in triplicate to the electroplating and anodizing equipment section of the WPB. In this appeal the appellant should give the name of the buyer, the date of the order, the date the shop work was begun, the percentage of work completed, all facts on the completion of components and parts, the number of man-hours put into the job, and why the machine cannot be used for war purposes.

"Spot Authorization" Sharply Restricted The War Production Board warns manufacturers that although Priorities Regulation No. 25 has not been revoked "spot authorization" for civilian goods has been drastically limited because of the urgent need for things military. Allotments and authorizations already granted have not been canceled. Spot authorization can still be approved to utilize any amount of idle and excess material provided the applicant has available facilities and labor. No new allotments will be made on copper wire or brass mill products. No limit has as yet been placed on new allotments of aluminum.

Electroplating Equipment Parts Are Scarce From a reliable source it was learned that there is a shortage of motors, speed reducers, conveyor chains, and pumps. The immediate future holds no improvement in this situation.

Who Keeps a Sales Control System? Someone has asked: How many metal finishers keep a service sales control system? Of course, some of the small platers keep their sales records in their heads. Others keep a very simple record system which tells nothing about the customer. Only a comparatively few keep a service control system. And yet platers should not fail to recognize that case histories of their customers are valuable sources of information in selling their services to actual and potential customers. This idea should be given careful thought for it will aid the plater in increasing his profits.

Hinckley Reports to Congress Robert H. Hinckley, director of the Office of Contract Settlement, in his report to Congress on January 29, 1945, states that canceled contracts during the period June-December, 1944, amounted to $25,483,346,000. Out of this $13,920,795,000 has been settled and $11,562,551,000 is still pending. About 70 per cent of the contracts terminated were of the fixed-price type.

Office of Contract Settlement Issues Three New Regulations During the past month the Office of Contract Settlement has issued three regulations to speed up war production and to aid in conversion for post-war production. Regulation No. 10 states the principles governing the clearance of termination inventory. This regulation provides a speedy procedure for the removal of termination inventories; and it supplies aids to war contractors on how to reconvert irrespective if they have fixed-fee or cost-plus contracts. Regulation No. 11 authorizes war contractors to destroy records provided photographs or microphotographs are made of such records. Regulation No. 12 states how prime contractors and subcontractors may file applications for relief for claims based upon defective, informal and quasi contracts for war goods and services.

Extension of Authorization Procedure Simplified The Chemicals Bureau of the WPB, on February 13, 1945, announced a simplified procedure to obtain extension of authorization for the use of allocated chemicals. Under the new procedure only a single letter may be written to the War Production Board, Chemicals Bureau, Allocation Officer, Washington 25, D. C., listing all allocated chemicals and allied products for which extension of authorization for use is requested beyond the limit set by Order M-300, paragraph (v) or by any other Chemicals Bureau order. In this letter the applicant should list each material, the use for which the authorization has expired, the unused quantity previously authorized for that use, the original allocation period, the date the material was ordered from the supplier, the requested shipping date, the date of arrival, and the requested time extension.

"The Business Man's Bureau" Explains Services of Commerce Department The Department of Commerce has just issued a very useful and informative booklet called "The Businessman's Bureau, Economic Series No. 40, by Corrie Cloyes." Copies may be obtained upon request to the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington 25, D. C., or by making the request at any of its field offices. In this 80-page booklet all of the Department's services which are available to businessmen are clearly described. It is one of the best booklets ever published on what and how the Department of Commerce is prepared to promote domestic and foreign commerce.

Five Point Program to Increase Production To increase war production Chairman J. A. Krug of the WPB on January 26, 1945, announced a plan which provides (1) that all prime contracts requiring additional labor over the producer's current WMC ceiling will be subject to Production Urgency Committee approval before they can be placed in a locality designated as Group I labor area by WMC; (2) that all subcontracts for Class A products involving $100,000 or more requiring additional labor over the current WMC ceiling, will be subject to Production Urgency Committee approval before they can be placed in a locality designated as a Group I labor area; (3) that no spot authorizations will be made in any Group II labor area unless they are unanimously approved by the Production Urgency Committee concerned; (4) that restrictions on construction will be strengthened, and (5) that full support will continue to be given to WMC's employment ceiling program, which went into effect July 1, 1944.

How to Improve Methods of Production Service Offered By WPB The Office of Production Research and Development of the War Production Board, Washington 25, D. C., is urging war industries to take advantage of its service to assist in developing improved methods of controlling the quality of products and save waste. This service, officials point out, will aid in providing reliable information for the determination of rational tolerances on quality characteristics, save essential materials by reducing or eliminating the production of scrap, and assist in better utilization of manpower by reducing or eliminating rework as well as reduce the amount of inspection work.

Production During the Second Quarter of 1944 The Bureau of Census of the Department of Commerce on January 30, 1945, completed the compilation of the value of shipments during the second quarter of 1944. During this period shipments of abrasive wheels amounted to $12,341,000; electroplating and anodizing equipment amounted to $1,935,000; silverware amounted to $10,687,000; identification plates, badges and emblems amounted to $2,354,000; musical instruments amounted to $292,000 and jewelry amounted to $11,301,000.

Chemical Situation for 1945 in a Nutshell The Washington chemical experts are of the opinion that the current shortage of sodium cyanide will continue to be tight for some months. The demand for soda ash and caustic soda are expected to be high during 1945. They predict that there will be a large consumption of organic chemicals in 1945. There will be a substantial demand for protective coatings and camouflage paints during the year. Linseed oil, synthetic resins, and organic solvents will continue to be a problem for the industry.

Primary Chromium Chemicals Prices Increased The Office of Price Administration, on February 13, 1945, through the issuance of MPR 575 increased the maximum prices for primary chromium chemicals. Sodium bichromate, crystals or granular; potassium bichromate, crystals or granular, and powder; and neutral sodium chromate, anhydrous or crystal, were increased fifty (50c) cents per hundred pounds. Sodium bichromate liquor and sodium chromate liquor were increased fifty (50c) cents per hundred pounds. One bath-chromium tanning compound, dry basic chromium sulphate was increased twenty-five (25c) cents per hundred pounds. And chromic acid was increased seventy-five (75c) cents per hundred pounds.

Cutlery Industry Wants WMC to Clarify Some of Its Regulations During the first part of February a number of WPB industry advisory committees requested identification of the particular items which are included in the classification "cutlery" as the term appears in the list and index of critical and essential activities as issued by the War Manpower Commission as a guide to Selective Service. Members of these committees were told by WPB officials that copper base alloy is extremely critical, so much so that none may be available for several months to the cutlery industry. The use of lead for cutlery production during the first quarter of 1945 has been cut to 30 per cent of the amount used during the first six months of 1944.

More Iron and Steel for Enameled Ware Industry Direction 2 to Limitation Order L-30-b, issued on February 14, 1945, allows manufacturers to use sufficient iron and steel to make half as many cold pack (water bath) canners for the 1945 canning season as they made in the year ending June 30, 1941.

Flatware Situation Discussed By WPB WPB officials told members of the Flatware Manufacturers Industry Advisory Committee, at their February meeting, that even though restrictions on the use of materials for table flatware have not been tightened nevertheless deliveries on allotments will be limited because of the increased need of materials for military purposes in 1945. They informed the Committee that there was enough nickel available to meet table flatware manufacturers' essential needs. They also pointed out that every effort will be made to provide sufficient material for the maintenance of silver plated flatware of war plant cafeterias, hospitals and other public eating places. Flatware manufacturers were urged to file as soon as possible Form WPB-3820 for permission to use labor in the second quarter of 1945, since production will not be authorized on Form WPB-2719, and steel will not be allotted to any manufacturer under the flatware program until this form has been filed and approved.

Galvanized Ware Production Behind Schedule Members of the Galvanized Ware Manufacturers Industry Advisory Committee reported to the WPB, at their January meeting, that the production of galvanized ware has lagged behind schedule because of manpower shortage and delay in delivery of galvanized sheets. It was said that the delivery of galvanized sheets were sometimes two and three months behind schedule. War Manpower Commission representatives told the committee that the galvanized ware industry is not classed as "essential."

Lead Order Amended Since February 28, 1945, manufacturers and distributors have been prohibited from the selling of certain non-essential products containing lead such as statuary and art goods except church goods; games and toys; tennis court markers; costume jewelry, novelties and trophies; buttons, badges, emblems and regalia except for the armed forces; and casket hardware. Lead cannot be used for plating except for uses permitted in List B of General Preference Order M-38 as amended on February 1, 1945. In this amended order lead uses were liberated moderately in List B for war purposes.

Nickel Sulfate Needed in Brazil for Plating Industry From official sources it was learned that there is a considerable demand for nickel sulfate in the Sao Paulo district of Brazil. Nickel sulfate is used for electroplating many metal articles, but its single principal use has been for coating tableware. It is especially needed for the expanding Brazilian domestic production of surgical instruments and other metal articles which were formerly imported.

Porcelain Enameled Ware Industry Adversely Affected By Gas Shortage At the February meeting of the WPB Porcelain Enameled Utensil Industry Advisory Committee it was learned that the industry is being adversely affected by the current shortage of natural gas and by the delays in the delivery of steel. The industry was urged to keep itself well informed on the rapidly changing chemicals situation. Some of the metallic oxides and other chemicals used by porcelain enameled ware producers have become critical.

Price Regulation No. 14 Now in Ten Parts The Office of Price Administration, on January 29, 1945, broke down Revised Supplementary Regulation No. 14 into ten separate parts by grouping related services and commodities in each part. The parts which are of special interest to *Metal Finishing* readers are Chemicals, Drugs, and Paints SR-14F; Metals and Minerals and Products SR-14G; Machinery and Parts SR-14K; and Consumer Goods SR-14J. The parts made no changes in prices or in the substance of provisions of the older order.

Service Equipment of Surplus Handbook Issued The Surplus Property Board recently released Section IX, Industrial and Service Machinery and Equipment, of "Handbook of Standards for Describing Surplus Property." This section which can be had from the Government Printing Office, Washington 25, D. C., for 15 cents tells how Government officials should describe such equipment as electroplating and anodizing equipment, filters, driers, rectifiers, motor generator sets, spray equipment, ventilating equipment, and other items.

Free and Domestic Silver Distinctions Removed The distinction between the use of Treasury "free" silver and domestic silver has been removed through the issuance of Direction 3 to Order M-199 on January 23, 1945. Treasury "free" silver is that which has been sold by the Treasury Department with the approval of the WPB. Free silver may now be used for any purpose for which domestic silver may be used. This change in the restrictions officials of the Precious Metals and Mercury Section of the WPB said does not mean an increase in available silver.

Sterling Silver Committee Meets in Washington At the February meeting of the Sterling Silver Manufacturers Industry Advisory Committee, WPB officials told members of the committee that the recent removal of the distinction between the use of Treasury "free" silver and domestic silver offers manufacturers of sterling silverware a better opportunity to obtain silver to the extent of their quotas. No increase in silver quotas is contemplated.

Patents

Coloring Copper Black

U. S. Pat. 2,364,993. W. R. Meyer, Dec. 12, 1944. The process of producing a black surface on copper or copper alloy articles which comprises immersing the surface in a hot aqueous solution consisting essentially of an alkali selected from the group consisting of sodium hydroxide and potassium hydroxide and a chlorite selected from the group consisting of sodium chlorite and potassium chlorite.

Pickling Aluminum

U. S. Pat. 2,365,153. D. E. Stevens, assignor to Hammond Aircraft Co., Dec. 19, 1944. The method of conditioning aluminum sheets for welding that comprises the steps of: first covering the surfaces of the sheets with a solution of hydrofluoric acid until the oxide on the surfaces thereof is broken, then covering the surfaces of said sheets with a solution of hydrochloric acid until the solubles in said hydrofluoric acid and the remaining oxide on said surfaces are cleaned therefrom.

Detergent Composition

U. S. Pat. 2,365.215. J. C. Rhodes, Dec. 19, 1944. A finely divided free-flowing non-caking readily water-soluble detergent powder composition comprising by weight about 25 to 75% sodium metasilicate, 10 to 40% sodium carbonate, an effective amount up to 35% sodium bicarbonate, 5 to 20% of an organic wetting agent and 1 to 15% tetrasodium pyrophosphate in substantially unreacted form, said composition having a pH about 9 to about 11.5 in about 1% by weight aqueous solution.

Corrosion Prevention of Iron

U. S. Pat. 2,366,477. E. D. Bayley, Jr., assignor to The William Bayley Co., Jan. 2, 1945. The method of applying a protective coating to a ferrous body including the following steps: dipping the body to be coated into a bath of fused sodium hydroxide provided with an electrode, passing an electric current from the body functioning as a cathode to the electrode functioning as an anode so as to remove the iron oxides and other foreign matter from the surface of the body to be treated, reversing the polarity of the current causing an oxide coating to be formed upon the surface of the body, removing the body from the sodium hydroxide, rinsing the body and dipping it into a weak phosphoric acid solution saturated with metallic phosphates of the group consisting of iron phosphate, manganese phosphate, zinc phosphate and copper phosphate having added thereto copper nitrate, the oxide coating on the surface of the body neutralizing the film of phosphoric acid in contact with the body so as to precipitate the metallic phosphates upon the surface of the body to thereby form a protective coating.

Electrolytic Polishing

U. S. Pat. 2,366,712. C. L. Faust, assignor to Battelle Memorial Institute, Jan. 9, 1945. The method of anodically polishing stainless steel, which comprises making the stainless steel the anode in a solution comprising as predominant ingredients, from 0.1 to 85% of phosphoric acid, from 0.1 to 65% of CrO_3, and from 13 to 66% of water, all of the percentages being by weight of said solution and the relative percentages of said three solution ingredients lying within the area defined on the accompanying diagram by the line AB, the straight line BC, the line CD and the straight line DA, and passing an electric current therethrough of sufficient density and for a sufficient period of time to effect a polishing of said stainless steel.

Electrolytic Polishing

U. S. Pat. 2,366,713. C. L. Faust, assignor to Battelle Memorial Institute, Jan. 9, 1945. The method of anodically polishing an article having a surface of nickel or of a non-ferrous nickel alloy, which comprises making said article the anode in a solution containing from 33 to 85% of phosphoric acid, from 0.1 to 38% of CrO_3, and from 13 to 42% of water, the total acid concentration in said solution being from 58 to 87% all of the percentages being by weight of said solution and the relative proportions of said three solution ingredients lying within the area defined on the accompanying diagram by the line ACB and the straight line BA, and passing therethrough an electric current of sufficient density and for a sufficient duration of time to effect a polish on said surface.

Electrolytic Polishing

U. S. Pat. 2,366,714. C. L. Faust, assignor to Battelle Memorial Institute, Jan. 9, 1945. An electrolyte for use in the anodic polishing of copper containing from 75 to 84% by weight ortho phosphoric acid and from 0.25 to 2% trivalent aluminum, the balance comprising essentially water.

Polishing Disc

U. S. Pat. 2,366.877. C. F. Schlegel, assignor to The Schlegel Mfg. Co., Jan. 9, 1945. A processing disk having a body formed of a fabric strip wound spirally upon itself about the axis of the body, said strip for a portion of its width and along one longitudinal margin being woven and for the remainder of its width and along the opposite longitudinal margin being composed only of loose weft strands projecting from the woven marginal portion forming a pile on one side of the disk body, said strip having its longitudinal woven marginal portion only impregnated with a rubber composition entering the interstices and securing the weft strands to the warp strands against detachment therefrom and securing the woven marginal portion of successive spirals adhesively together, said rubber composition extending as a connective binder body throughout the successive spirals of the spirally wound woven portion only of the strip.

Hot Galvanizing

U. S. Pat. 2,366,879. E. M. Skipper, signor to Locke Insulator Corp., Jan. 1945. In a machine of the class descri the combination of an upright substan cylindrical housing, a substantially h zontal plate mounted within the housing rotatable about an axis concentric th with, the outer edge of said plate be spaced from the side inner wall of the h ing to provide an opening through w articles dropped into the upper portio the housing may fall to the bottom the and radially extending arms rigidly mou on the upper surface of said plate and tending outwardly of the marginal e thereof for striking articles dropped the housing and projecting them toward sides thereof upon the rotation of said

Degreasing Machine

U. S. Pat. 2,366,949. J. G. Wopp H. H. Hummel and A. J. Newman, assig to Curtiss-Wright Corp., Jan. 9, 1945. h cleaning apparatus, a tank containing region of vapor, means for inserting arti to be cleaned into the region of the clean vapor, means for spraying the articles w the vapor condensate, means responsive the condition of the vapor for controlling operation of the spraying device includ means automatically incident to movement the inserting means for pre-setting the trol means, said control means being effec only upon the return of the vapor to a pr termined state to effect the automatic op tion of the spraying device.

Chromium Plating

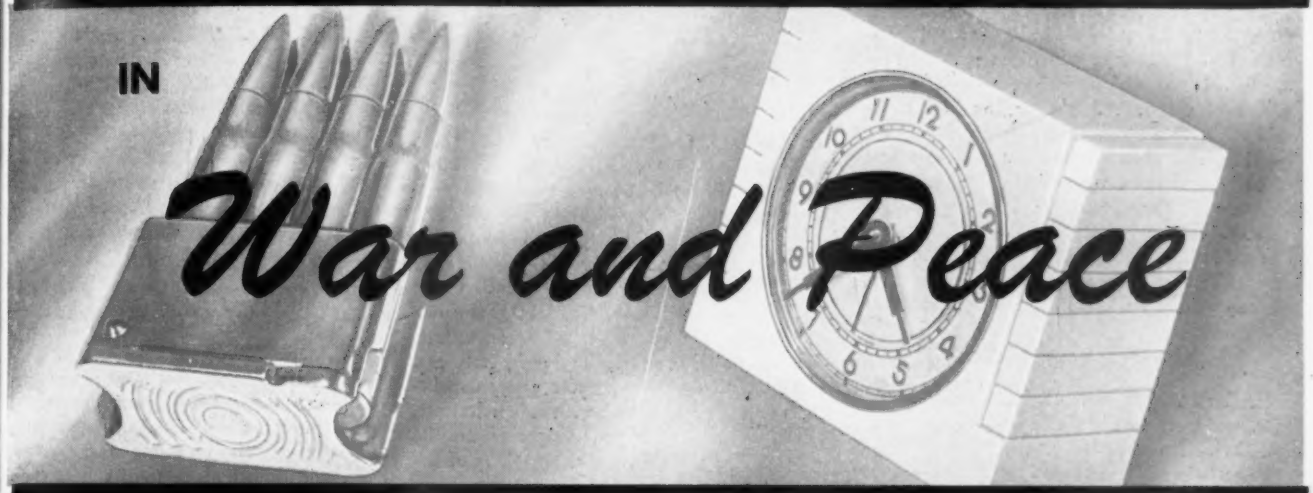
U. S. Pat. 2,367,159. H. Van der H assignor, by mesne assignments, to Van Horst Corp. of America, Jan. 9, 1945. process for producing piston rings ha an electrolytically deposited layer of ch mium on their peripheral surfaces consis in forming a transverse groove in the peri ery of each of a number of undivided ri assembling a number of such rings toget in exact axial alignment to form a cylind depositing a layer of chromium electrol cally on the surface of the cylinder, separ ing the rings, and dividing each ring on line of the groove, said grooves being of s width that the deposit of chromium is continuous at the grooves.

Gas Pickling

U. S. Pat. 2,367,174. R. F. Renkin, signor of one-half to H. A. Roemer, Jan. 1945. Sealing construction for a chamb containing a fluid medium for treating continuous metal strip, including a pair sealing rollers in said chamber for engag opposite sides of said strip, means yieldin urging each of said rollers toward and m taining the same in sealing engagement w the strip, and a roller support having faces rollably engaging the strip engag surfaces of said rollers on opposite sides said strip.

KEMTEX COMPOUND No. 25

IN



War and Peace

KEMTEX COMPOUND No. 25, a new powerful soak cleaner, whose effectiveness is derived from an unusual combination of basic salts producing a new formula.

KEMTEX COMPOUND No. 25 is designed for bulk work in cleaning cartridge clips and cases as well as alarm clocks or builders hardware.

KEMTEX COMPOUND No. 25 is particularly effective in cleaning drawing compounds, difficult to remove oils, lubricants and pigments from steel or steel alloys by immersion alone.

KEMTEX COMPOUND No. 25 has the ability to penetrate dirt films rapidly, and its high tolerance for grease absorption makes it highly desirable as a heavy duty immersion cleaner.

KEMTEX No. 11, a cleaner similar in chemical composition to KEMTEX No. 25, but not as strong. Very free rinsing. May be used on brass or steel.

KEMTEX Type "C", also an immersion cleaner, suitable for use on brass, brass alloys, nickel silver, and other combinations of non-ferrous metals.

KEMTEX No. 100-A Compound, an electrolytic cleaner for brass, copper, and other non-ferrous alloys. Cleans effectively without surface etch. May be used anodically or cathodically.

KEMTEX Aero Compound, designed solely for cleaning by immersion sheet or shaped aluminum or aluminum alloys. Will not etch or discolor surfaces.

KEMTEX Stripping Compounds, a complete set of new formulations available for removing all types of enamels, japans, or lacquers.

KEMTEX No. 707, a pressure type washing machine cleaner which works fast at a low concentration without producing excessive foam.

Aqua-Solv, a new development for emulsion cleaning technique. Designed especially for washing machine application, but is suitable for still tank cleaning. Film protection produces insurance against corrosion and finger prints.

KEMTEX Abrasive No. 30-B, a light burring media used in any type of tumbling or cutting-down barrel.

KEMTEX Abrasive No. 100-B, a heavy duty burring material with extremely fast cutting action. Generally used with steel balls, slugs, rocks, or other media to obtain additional pressure.

In addition to the above standard materials we are constantly formulating new ones, to suit changing customer requirements. Your problem will receive prompt and intelligent service.

W. D. MAC DERMID *Chemical Company*
BRISTOL, CONNECTICUT

Electrodeposition

U. S. Pat. 2,367,314. A. G. Russell, assignor to Western Electric Co., Inc., Jan. 16, 1945. In a method for making a cup-shaped transmitter electrode, the steps of forming a copper base alloy into a body having the general shape desired in the completed electrode and excess material on the concave surface of the cup portion, electrodepositing a layer of nickel on the entire surface of said body, machining the nickel coated body to remove the nickel layer and the excess alloy from the concave surface of the cup portion, immersing a quantity of the machined bodies loosely in an aqueous electrolyte comprising from .75 to 2.5 ounces of sodium gold cyanide, 3 to 8 ounces of potassium cyanide and .20 to .70 ounce of potassium hydroxide per gallon of water, and plating the bodies in said electrolyte at an average current density ranging from .2 to .6 ampere per square foot of body surface while maintaining the temperature of the electrolyte between 105°F. and 135°F. to cause the deposit of a continuous gold film on the concave surface of the cup without causing the deposit of any gold on any other portion of the body.

Abrasive Composition

U. S. Pat. 2,367,358. H. Kott and M. Yawitz, assignors to Fish-Schurman Corp., Jan. 16, 1945. An abrasive composition of matter consisting of small sized diamond particles dispersed throughout a metallic matrix, the said metallic matrix consisting of an iron-carbon alloy containing carbon within the range of .45% to 1.0% and the said diamonds being secured and retained in said matrix, by a relatively thin film surface coating of a platinum group metal mechanically adherent to the diamond surface on one side and alloy bonded to the iron-carbon-alloy matrix on the opposite side.

Sand Blasting

U. S. Pat. 2,367,647. W. P. Mott, assignor to J. M. Schatz and H. R. Glasser, Jan. 16, 1945. For use in a sand blasting device, a sand filled tank provided with a port for horizontal discharge of sand, and a control means comprising a housing mounted laterally adjacent said tank and communicating therewith through said port and provided with a vertical passage designed to be connected with an air supply and including a top inlet and a bottom outlet, a valve in said housing comprising spaced front and rear walls and a pair of spaced cross members connecting the walls, the rear wall being arranged to control the port of said tank, a shaft journaled in the housing and having an arm extending betweep said cross members for actuating the valve, and means carried by the valve for controlling the bottom outlet, whereby upon opening of said valve the air passing through said housing causes discharge of sand from said tank under injector action and discharge from the housing under air propulsion.

Pickling Iron

U. S. Pat. 2,367,811. S. F. Urban, Jan. 23, 1945. The method of pickling ferrous metals, which comprises placing a sulphuric acid pickling solution in a suitable tank, providing a mercury cathode and an insoluble anode in the said solution, adding from about 3 per cent to about 12½ per cent ammonium sulphate to the solution, and electrolyzing the said solution in the presence of ferrous metal being pickled, thereby depositing iron from the solution in the mercury cathode substantially as rapidly as it enters the solution from the ferrous body being pickled, and regenerating free sulphuric acid in the solution in amounts chemically equivalent to the iron deposited in the cathode, thereby maintaining a substantially constant iron and sulphuric acid content in the solution.

Silvering Glass

U. S. Pat. 2,367,903. C. Trevail and K. P. Gladney (Canada), assignors to Hobbs Glass Ltd., Jan. 23, 1945. A method of coating a surface with a reflecting film of silver which comprises projecting on to the surface in the form of a unitary spray separately formed aqueous silver nitrate solution and an aqueous reducing solution containing one of a group consisting of hydrazine sulfate, hydrazine nitrate and hydrazine hydrate and as an addition agent one of a group consisting of magnesium sulfate, sodium sulfate, potassium sulfate and ammonium sulfate the addition being within the proportions of 0.2 to 1.25 parts per 100 parts of water.

Plating Rack

U. S. Pat. 2,367,909. J. W. Wanner, assignor to General Motors Corp., Jan. 23, 1945. A hanger for a tubular member comprising in combination an inflexible plate; a nut on said plate; a screw-stud extending through the plate and into said nut, said stud having a head portion on the side of the plate opposite the nut; a stack of centrally perforated discs on said stud between the head portion thereof and the plate, said discs being dished convexedly relatively to the plate and having radial slots whereby when said discs are inserted into a tube and the nut operated to draw the head of the screw stud toward it said discs will be flattened causing their peripheral edges grippingly to engage the inner wall of the tubular member; and a hook member threadedly received by the screw stud at its outer end.

Detergent Composition

U. S. Pat. 2,367,971. J. J. Spiegler, Jan. 23, 1945. The process of producing a washing and cleaning agent which consists in mixing approximately six parts by weight of sodium hydroxide (38°Bé.), about twenty-two parts by weight of sodium silicate (36° Bé.), and about twenty-eight parts by weight of borax, adding about twenty-two parts by weight of hydrogen peroxide of 30% by weight concentration, and about twenty-two parts by weight of sodium silicate (36°Bé.) thereto, stirring the mixture until it becomes gelatinous, pouring the resultant mass onto a surface, and permitting said mass to dry.

Terne Coating

U. S. Pat. 2,368,128. B. P. Finkbo... W. E. Marshall, assignors to The Am... Rolling Mill Co., Jan. 30, 1945. A p... of terne coating which comprises bri... a cleaned metal body into associatio... molten terne metal and withdrawing th... metal body therefrom through exit ... which are maintained in contact w... molten anhydrous flux, said flux comp... ammonium bromide and a solvent ... namely chloride of zinc.

Corrosion Prevention

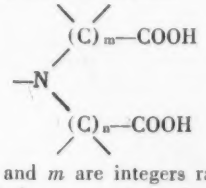
U. S. Pat. 2,368,604. E. R. White, ... signor to Shell Development Co., Jan. ... 1945. A corrosion-preventive compos... comprising predominantly a stable sub... tially neutral vehicle containing finely ... persed a small amount sufficient to re... corrosion of a free dicarboxylic acid ha... at least 16 carbon atoms, the carboxyl ... cals in said acid being linked throug... trivalent nitrogen atom.

Corrosion Prevention

U. S. Pat. 2,368,605. E. R. White, assi... to Shell Development Co., Jan. 30, 1... A corrosion-preventive composition com... ing predominantly a substantially neu... vehicle containing finely dispersed a s... amount, sufficient to inhibit corrosion, ... halogen-free hydrocarbon monocarbo... acid alpha or beta hydrosulfide having ... 10–30 carbon atoms.

Corrosion Prevention

U. S. Pat. 2,368,606. E. R. White, assi... to Shell Development Co., Jan. 30, 194... solid metal corrodible by salt solution co... with a corrosion-preventive film formed ... dicarboxylic acid having at least 16 ca... atoms and having the formula



wherein n and m are integers ranging ... 1 to 8, and the unoccupied valences are ... to hydrogen or hydrocarbon radicals.

Corrosion Prevention

U. S. Pat. 2,368,607. E. R. White, assi... to Shell Development Co., Jan. 30, 194... structural normally corrodible metal co... with a corrosion-preventive film of hy... carbon monocarboxylic acid hydrosulfide ... lected from the group consisting of the al... and beta hydrosulfide acids having ... 10–30 carbon atoms.

Method of protecting a structural ... mally corrodible metal from corrosion ... prising spreading over its surface a ... dispersion in a substantially neutral veh... of a hydrocarbon monocarboxylic acid ... drosulfide selected from the group consis... of the alpha and beta hydrosulfide acids ... ing from 10–30 carbon atoms.

Industrial Plating

FILTERS

For Bright Nickel, Nickel, Chrome, Copper Sulphate, Cyanide Copper, Brass, Zinc, Cadmium, High Speed Copper, Brite Zinc, Silver, Electrocolor and others;

Offer You Many Important Advantages . . .

★ **PERFECT CLARIFICATION**
Ultra fine filtration — *GUARANTEED!* Industrial filters offer an ideal system for removal of carbon, clays, or lime from treated solution in process of eliminating iron, organic impurities, oil, etc.

★ **LARGE FILTER AREA**
This feature means rapid action and longer filter cycles. Flow rates are always governed by the filtration area within the filter.

★ **LARGE FILTER CHAMBER**
Means greater sludge holding capacity. A plating filter having a large chamber will not require frequent cleaning, due to becoming quickly packed with sludge.

★ **CLOSED FILTRATION**
Filter plates are locked in leak proof chambers. There is no loss of valuable solutions with Industrial Filters.

★ **AUXILIARY SUCTION**
Industrial filters give you a direct means of introducing filter aids in the process of filtering and purifying solutions.

Be Sure You Get All These Features in the Filter You Buy!

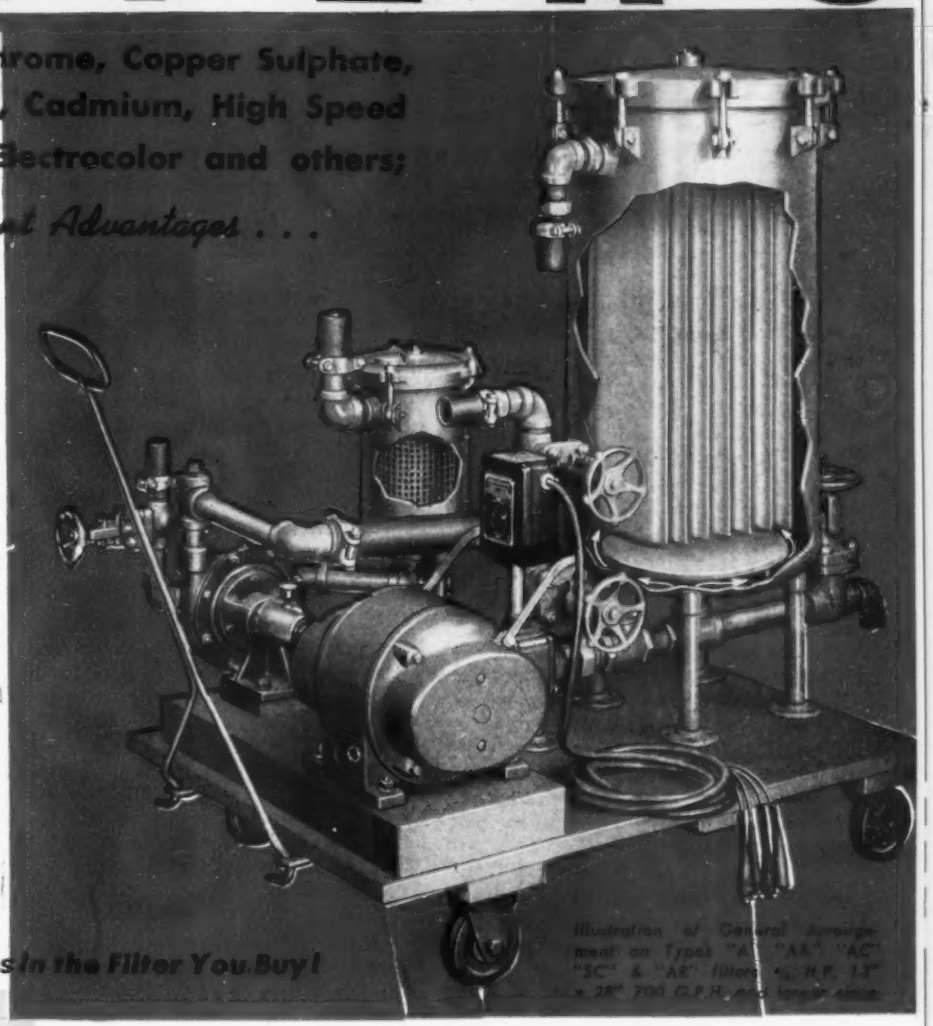


Illustration of General Arrangement on Types "A" "AA" "AC" "SC" & "AE" filters 4 H.P. 1¾" x 28" 700 G.P.H. and larger sizes

SALT FOG
Corrosion Test Equipment

This modern instrument is designed to meet all requirements of latest "Salt Fog Testing Procedure Specifications" to determine corrosion resistance of plated, coated, lacquered or painted parts.

Serious rejection losses on industrial finishes which must meet Army or Navy specifications are avoided by systematic tests with Industrial Salt Fog Test Equipment.

STANDARD SIZES

No. 1—48" long 26" wide 36" deep No. 3—30" long 18" wide 30" deep
No. 2—36" long 24" wide 30" deep No. 4—24" long 15" wide 30" deep
No. 6—14" long 12" wide 12" deep

We Carry Complete Stocks of Filterbestos, Activated Carbon, Activated Clay, (Super-Filtrol, and Chlor-o-cel) and All Grades of Filter Powder Ready For Shipment

INDUSTRIAL FILTER & PUMP MFG. CO.

1621-25 WEST CARROLL AVENUE CHICAGO 12, ILLINOIS

SHOP PROBLEMS

PLATING AND FINISHING
POLISHING — BUFFING
CLEANING — PICKLING
HOT DIP FINISHES

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Non-Tarnishing Silver

Question: In the September, 1942 issue on Page No. 473, under the heading of "Non-Tarnishing Silver", you state in the last paragraph of the answer:—

"H. Krause says tarnish of silver can be delayed by making the silver cathode in chromic acid solution, or in a solution, of chromates plus sulfuric, at room temperature or higher. Use 5 to 7 volts for 1 to 5 minutes."

We have done some work along these lines and, frankly, although a certain degree of tarnish resistance is imparted to the silver, the results are not good enough to warrant the adoption of this type of process.

However, before discontinuing our research on this, we would like to check further on H. Krause's data. Can you furnish more information about the above reference? With this, we will then be able to compare notes and see whether we have overlooked anything in our investigation.

I. W. M.

Answer: The item referred to will be found on page 169 of the book entitled, *Metal Coloring & Finishing*, second edition, by H. Krause.

Details on this process will be found in German Patent 630,934.

Hard Chromium

Question: "We know that some people in tool and machine industry are using hard chromium. We have all the means for preparation of hard chromium, but when we develop it, it is too soft.

"How can we correct this condition?"

T. N. R. B., Inc.

Answer: A properly applied chromium deposit should have a hardness in the neighborhood of 750 Vickers.

We do not know how the softness of the chromium can be corrected without knowing the operating details. If this information is furnished, we shall be pleased to advise further.

Plating Fresh Flowers

Question: Do you have any booklets or printed matter on the subject of *plating fresh flowers* that you would be willing to send to me.

The idea of plating flowers is all news to me so I would greatly appreciate any information you could give me on the subject.

McP. G.

Answer: Metallizing of flowers requires much experience and experimentation. Information on the subject will be found on pages 101-4 of the 1942 edition of the *Plating and Finishing Guidebook* which may be obtained from this office at $1.00, payable in advance.

Drying Parts After Plating

Question: We are enclosing catalog sheet showing some items we manufacture. We would appreciate having you advise us the method to use, best in your estimation, to dry these parts after plating. At the present time we tumble them in sawdust and this produces a nice finish but this also produces a lot of objectionable dust. Do you know of any tumbling barrels that will do this operation and not cause dust and if so who manufactures them? Or if there is a better method.

O. Mfg. Co., Ltd.

Answer: If an objectionable amount of dust is created upon tumbling the parts in sawdust, it may be advisable to consider the purchase of a centrifugal dryer which is equipped for circulation of warm air.

These may be purchased through your local supply houses.

Embrittlement from Hydrogen

Question: In a recent issue of "Metal Finishing", it was mentioned that as little as 0.0005% of hydrogen in a plating was sufficient to cause embrittlement.

I would appreciate receiving information as to the source of this statement.

F. T. & R. Labs.

Answer: We refer you to C. A. Zappfe and C. L. Faust, Proc. AFS, page 95 (1944). The authors report embrittlement from an amount of hydrogen corresponding to Fe5,000H which, on a weight basis would be approximately 0.0004%.

Thickness Measurements

Question: We have been advised by the Battelle Memorial Institute that the following literature could be obtained from you and if possible we would greatly appreciate receiving duplicate copies of same.

"Thickness Measurements of Electrodeposited Metals".

S. S. Co., Ltd.

Answer: A section on this subject appears on pages 147-156 of the 1944 edition of the *Plating and Finishing Guidebook*, copies of which are available through this office at $1.00 each, payable in advance.

Electrolytic Polishing

Question: Recently I read an article on Electrolytic Polishing in your handbook (1944 edition). The process interests me and I would like to obtain additional information.

I would appreciate it if you would tell me where I might find this information.

W. W. Co.

Answer: Articles on this subject have been published from time to time, and we would suggest that you examine back issues of *Metal Finishing* for same.

An appreciable number of patents have also been issued, and abstracts of these will be found in *Metal Finishing*.

Removing Fumes

Question: We have been asked by our client to ascertain from you what manufacturers fabricate equipment for the removal of acid from gases exhausted. We are immediately concerned with the removal of chromic acid from anodizing fumes.

A. C. E. Co.

Answer: We are enclosing herewith a list of manufacturers of exhaust systems as they appear on page 90 of our 1944 issue of *Metal Finishing Buyers' Directory.*

We would suggest that you communicate with such manufacturers as they would probably be able to supply you with the proper equipment.

Neutralizing Exhaust Air

Question: We are confronted with the necessity of neutralizing the exhaust air drawn off the chrome and copper plating tanks.

Could you suggest where I could obtain information on this subject, either in one of your past issues, or a book on the subject.

We find the air has enough destructive properties to attack the surrounding metals on the roof.

E. W. & S. Co.

Answer: A water-wash exhaust system would be suitable for this purpose and the attached list of manufacturers of exhaust systems can be referred to for details.

(*Continued on page* 141)

AE CLEANER

FOR YOUR ALUMINUM CLEANING WORK

A low pH cleaner, equipped with synthetic emulsifying and wetting agents. Designed and used for both still tank and electrocleaning of aluminum.

AE cleaner is safe, efficient and economical. It does not attack the metal when used at high concentrations and high temperatures.

Cowles

TECHNICAL SERVICE ON REQUEST

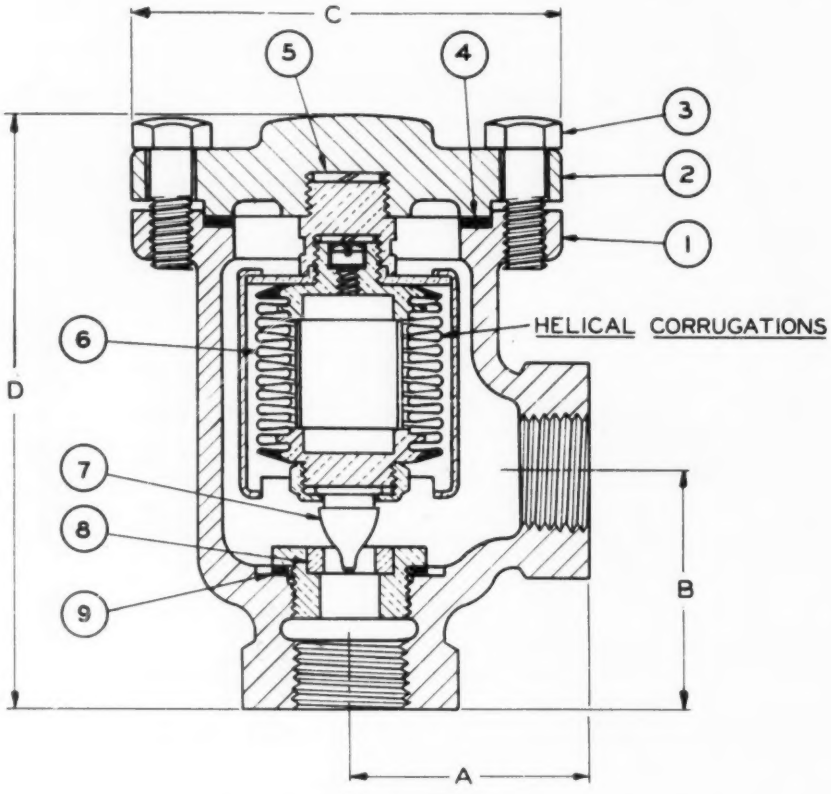
THE COWLES DETERGENT CO.

METAL CLEANER DEPT.

7016 EUCLID AVENUE • CLEVELAND 3, OHIO

NEW EQUIPMENT AND SUPPLIES

NEW PROCESSES, MATERIALS AND EQUIPMENT FOR THE METAL INDUSTRY



Steam Traps

Sarco Company, Inc., 475 Fifth Ave., Dept. MF, New York 17, N. Y., has announced successful manufacture of bellows from heavy wall bronze tubing, drawn and helically corrugated in their own plant by methods developed by them.

These have made possible the introduction of an entirely new line of thermostatic steam traps, for pressures up to 225 p.s.i using single, large diameter bellows, for inlet sizes ½" to 2" inclusive, and with capacities double those of the company's well known No. 9 series.

The new traps are available in two pressure ranges, No. 9-100 for pressures 0 to 100 p.s.i. and No. 9-225 for pressures 0 to 225 p.s.i.

The construction may be gathered from the illustration. The heavy wall bellows is screwed into the end closures and the joints are sealed by brazing, using the latest electronic induction heating equipment.

Significant Comparisons

Capacities in pounds of condensate per hour at 100 lbs. pressure

Old No. 9 series
- ½" 1300
- ¾" 1600
- 1" 2000

New No. 9 series
- ½" 2500
- ¾" 3400
- 1" 5200

These are actual capacities from tests under operating conditions with condensate temperature 20°F. below steam temperature. The corresponding capacities for cold water passing through the trap are approximately five times greater.

While in the old No. 9 series 1" was the largest size in which a single bellows could be used, all sizes of the new series, up to 2" incl. have single bellows.

Axial Flow Fan Units

Two new high efficiency axial flow fan units have just been announced by *Dynamic Air Engineering, Inc.*, of Los Angeles.

Equally unique in size from the mighty 60 inch to the midget 2 inch they are believed to be the largest low pressure and smallest high pressure propellers engineered and produced on the Pacific Coast.

Performance by ASH & VE standard code of test is as follows: The 60 inch low pressure propeller driven with a 10 h.p. 1150 r.p.m. motor delivers approximately 60,000 c.f.m. free air and 5,000 c.f.m. at ½ inch s.p. Wide general industrial use is expected par-

Professional Directory

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64 Years in Precious Metals

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Consulting Chemical Engineers
SALT SPRAY TESTING — CERTIFIED TO MEET ARMY AND NAVY SPECIFICATIONS. Testing of deposits-thickness, composition, porosity. Solution analyses, plant design, process development.
44 East Kinney St. Newark 2, N. J.

"Electro Chemical Technology"
E. J. HINTERLEITNER AND ASSOCIATES
821 NORTH AVENUE, W.
WESTFIELD, NEW JERSEY
PHONE: WESTFIELD 2-4766
NATIONWIDE, COMPLETE CONSULTING SERVICE FOR THE METAL FINISHING INDUSTRY.
Plant Design and Layout, Production Set-Up, Control and Product Testing, Cost Estimates, Etc.
20 YEARS IN FIELD
MEMBER A.E.S.
RE-CONVERSION AND PREPARATION FOR PEACE-TIME PRODUCTION: — *SPECIALIZATION*

Platers Technical Service Co.
Electroplating and Chemical Engineers
Complete services, including solution analyses, process development and deposit tests.
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Metal Finishing Consultant
War plating plants designed and streamlined for increased production.
LA 4-9794 233 W. 26th St.
New York City

KEY TO A PERFECT FINISH
CHICAGO
GRINDING WHEELS AND MOUNTED WHEELS
Chicago Wheel takes pride in providing you with exactly the wheel you need, for exactly the job you have, to give you exactly the finish you want!
There's half a century of experience behind this, fifty years of specializing on grinding wheels—grinding wheels with hundreds of varieties in shape, size, abrasive and bond formulas, engineered for the right tool speed and work pressure.
Come to Headquarters—Our long experience and testing laboratory are at your service, free for the asking. Tell us about your tough grinding or polishing job. Our abrasive engineers will report promptly, give you their tested solution.
TRY ONE FREE—A Chicago Mounted Wheel or an FV Bond Grinding Wheel sent promptly on request. Tell us size preferred and what you have to grind.
CHICAGO GRINDING WHEELS—For the duration, sizes up to 3" in diameter only, in various bonds including FV, the bond with a pedigree.
CHICAGO MOUNTED WHEELS—For internal or external grinding, burring and polishing. Made to fit any tool. Many styles, shapes and shank sizes.
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1101 W. Monroe St., Dept. ML Chicago 7, Ill.
Send catalog. Interested in
Mounted Wheels
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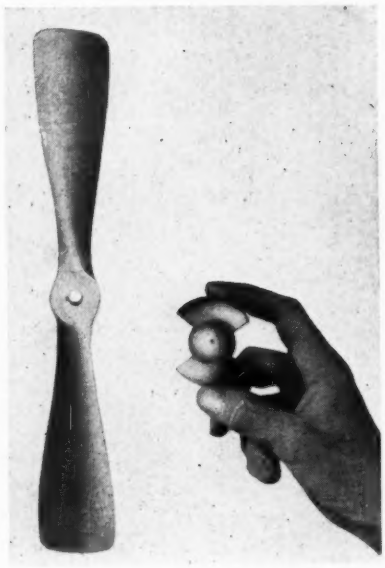
Send test wheel
Size
Name
Address
ARMY NAVY
MOUNTED WHEELS
SMALL GRINDING WHEELS
Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive industry.



ticularly where space, economy and efficiency is important in air movement.

The midget 2 inch propeller has been developed for a complete fan unit to be manufactured and marketed by Dynamic Air Engineering, Inc. It will be powered by a tiny motor of approximately two-thousandth h.p. and will deliver 30 c.f.m. at .30 inches s.p. Originally engineered for the cooling of modulators in air-borne electronic equipment, it is expected to find many and varied applications.

In addition to highly specialized fan units Dynamic Air Engineering, Inc., manufactures a complete range of low and high pressure fans designed to operate at speeds from 870 r.p.m. through the normal range of a.c. speeds and into series wound and high cycle speeds up to 14,000 r.p.m. or more.

All these fans from the 2 inch to the 60 inch are being built in both single stage and multi-stage varieties. Two-stage assemblies double the single stage pressure characteristics of any given unit. When multi-stage assemblies are built, guide vanes or contra vanes are employed to straighten the air stream between the various stages.

Complete technical information and performance curves are available. Write Dynamic Air Engineering, Inc., Dept MF, 1619 S. Alameda, Los Angeles 11, Calif.

Fluorescent Lighting Fixture

A new commercial lighting fixture employing 93″ fluorescent cold cathode low voltage lamps is now available. The manufacturer states that in addition to the eight-foot fixture, assemblies are also available for continuous line lighting. The "Simplicity" units are equipped with the 10,000-hour "Colovolt" Lamps which are instantaneous in starting and do not flicker. The manufacturer assures that the advantages of the long life expectancy of the Colovolt Lamp may be realized, even when the lamps are constantly turned on and off.

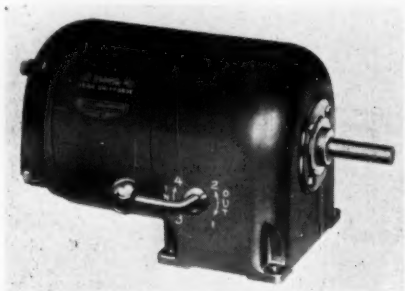
Further information may be obtained by writing to the General Luminescent Corp., Dept. MF, 638 S. Federal St., Chicago 5, Ill.

Gear Shift Drive Motor

The Lima Electric Company announces a new addition to their selective 4 Speed Machine Tool Gearshift Drive line. This unit is designed to power machine tools and other equipment requiring motor capacities of 1 hp or less. The unit is rated at ½ and ¾ hp at 1200 rpm and 1 hp at 1800 rpm.

Simplicity of design and compactness are features which make for high operating efficiency and for convenience in mounting where space is limited. Weighing only 85 lbs., the unit has an overall length of only 18″ including the shaft extension; the overall width, including terminal box and shifting lever is 12″, while the overall height is only 9″.

The new unit, identified as Type R is designed for continuous operation, with ample overload capacity. A Lima semi-enclosed, drip-proof, ball bearing motor of either 2 or 3 phase, 50 or 60 cycle, 220, 440 or 550 volts is furnished as a standard integral part of this unit. Type R is reversible in all speeds with the use of a reversing drum control. Single phase units in above sizes to be available when conditions permit.



Equipped with anti-friction bearings throughout; the shaft and all gears are of heat treated alloy steel, running in a bath of oil which assures the user long life and trouble-free operation. With evenly distributed speed changes, the ratios of Type R are 1 to 1, 1.33 to 1, 2 to 1 and 4 to 1. Shifting is done by means of a small lever which can be extended to any convenient position as required. Simply constructed, the shifting mechanism is trouble-free and easy to operate.

The distinctive design of Lima Type R makes it adaptable to modern machine design as an integral part of any unit requiring selective speeds of ½, ¾ or light duty 1 hp ratings.

For further information write or wire The Lima Electric Motor Co., Dept. MF, 3501 Findlay Road, Lima, Ohio.

Plater's Cleaner

A new plater's cleaner with superior rinsing qualities has been announced by the Kelite Development Laboratory, research division of Kelite Products, Inc., Dept. MF, 909 E. 60th St., Los Angeles 1. Calif.

The new Kelite Plater's Cleaner is said to eliminate calcium scale. It is used in a hot tank, with or without current, for cleaning brass, bronze, copper, babbitt, pot metal and other non-ferrous metals.

Dust Collector

A powerful yet inexpensive unit type Du Collector has been announced by the Ide Commutator Dresser Co., Dept. MF, 51 Park Ave., Sycamore, Ill.

Standard attachments simplify instal tion on grinders, buffers, sanders, polishe lathes and other machines. Being compa in size it readily fits behind or beside m chines as they stand. Re-location of m chines, elaborate housing, separate roo expensive ducts, etc., are unnecessary.

500 cubic feet per minute is develope through the two inlets by a ¾ horsepow 3450 r.p.m. motor, driving a 7½″ dia. x wide squirrel cage blower wheel.

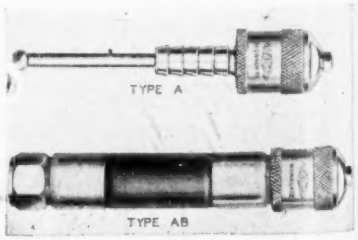
Dust laden air is drawn through the in pipes into twin cyclone separators where it whirled around at high speeds. The du particles being heavier than air natura move more slowly and drop down into t dust drawer. The lighter air passes o through a viscous coated filter where ve fine dust is removed. Clean air is d charged back into the room. The two dia. inlets can serve either one or t machines.

The filter consists of 20 layers of visco coated filter paper. To restore the filte efficiency after it becomes dirty, it is o necessary to peal off the first two laye This can be done five times without affecti its cleaning ability. Under average con tions a filter lasts approximately a year more.

Leak-Proof Air Guns

A new line of leak-proof Air Guns, i blowing chips, dust, dirt, kicking out finish parts, and operating air-driven tools, su as air vises, clamps, chucks, presses, etc. now being produced by the Trico Fuse M Co., Dept. MF, 2948 North 5th St., M waukee 12, Wisc.

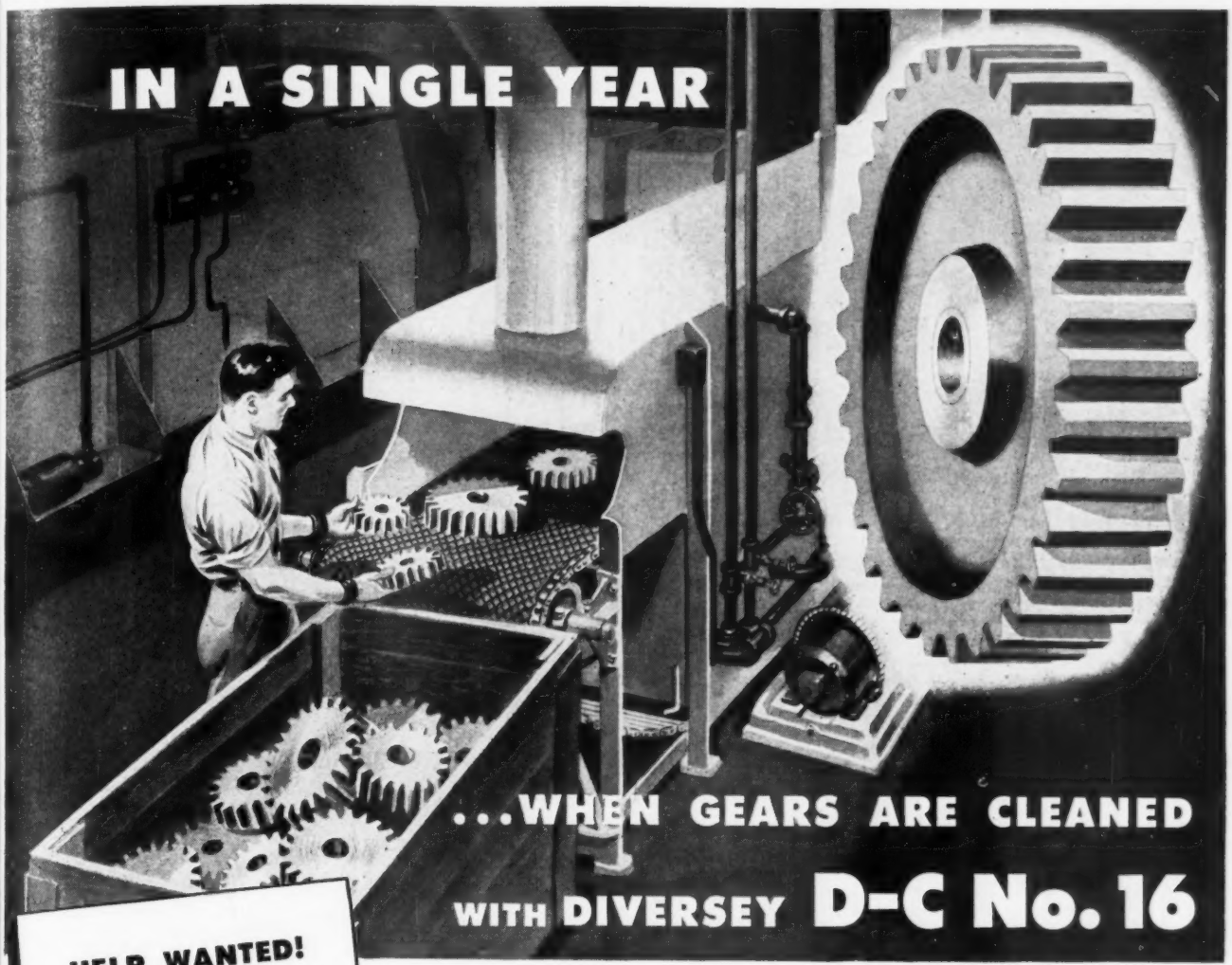
A slight "finger-tip" flex of the hose d charges a small puff or full blast of air desired. Operation is instant and positiv effecting substantial savings in air, pow and compressor maintenance costs. Effo less handling saves time, reduces operat fatigue and speeds production.



Levers, buttons, gaskets or glands a eliminated by the streamlined design. T patented ball and socket valve joint has on two moving parts—nothing to wear out replace. Air pressure helps close valve tight when finger-tip pressure is released.

The Type "A" is the most popular style f permanent applications. The Type "A style is recommended for remote contr applications. It is attached directly to th air pipe line and operated by hand, knee foot control, treadle, pulleys, cams, plunge etc.

$10,000 SAVED



HELP WANTED!

Here's one "help wanted" problem that's easily solved . . . even in these days of man-power shortages. If it's a problem in metal cleaning and working . . . the Diversey D-Man is always on deck to lend a helping hand. Backed by a Research Laboratory that has spent 18 years developing special purpose products, the Diversey D-Man can often show you ways to step-up production that require less manpower.

DIVERSEY D-MAN

With plenty of polishing compound to remove, cleaning of finished gears for airplanes can be a costly, tedious operation. For example, one plant, using a soap base material as an emulsifiable solvent, found that they had to run their gears through the automatic washing machine 3 to 4 times to get them clean. After switching to Diversey D-C No. 16, a single run through the machine completely removed all polishing compound. Cleaning costs were cut in half . . . a net yearly saving of about $10,000 . . . while output was stepped up three-fold.

Diversey D-C No. 16 is a triple duty product, used . . .

1. *As a solvent* for removing oily and greasy contaminations containing solids such as buffing and polishing compounds, drawing compounds, smut, dirt.
2. *As a water emulsion* for use in automatic washing machines handling iron and steel parts where rust inhibition is necessary.
3. *As a light-duty rust-proofing compound* between fabricating operations . . . eliminates need of heavy films.

D-C No. 16 is safe, non-toxic, non-inflammable at ordinary temperatures, practically odorless, non-corrosive and easy to remove. As a solvent, it combines effective solvent action with wetting and emulsifying power. As an emulsion, D-C No. 16 produces a stable, creamy white emulsion when poured into water. Non-foaming, it is an excellent cleaner for use in spray type washers. When used for rust-proofing, it leaves a light, clean film that does not gum or dirty inspection gauges. For liberal experimental sample, write Metal Industries Department.

THE DIVERSEY CORPORATION
53 W. Jackson Blvd., Chicago 4, Ill.

For better adherence in strongly alkaline solutions

Even your toughest plating solution won't relax the iron grip of Unichrome Stop-Off 322—because it's specially formulated for the most severe cycles. And this tough lacquer is convenient to handle—just brush, dip or spray it on at room temperature—it dries fast, doesn't lift or crack in hot dips and cleaners, never contaminates a solution. Clean-cutting, tight-holding edges on the work assure accurate demarcation between plated and unplated areas.

There's a heavy war demand for the new and improved resins in Unichrome Stop-Off 322. That means we can't always deliver at once. Better order your trial shipment today. For further information and prices, write to nearest office.

* Reg. U. S. Pat. Off.

PROPERTIES

Chemical Resistance—Excellent in all plating cycles.

Application — Can be brushed or dipped — successive coating is minimized.

Drying — Dries quickly at room temperature — adheres without force drying.

Stripping — Due to extreme adherence, material is usually dissolved off after plating.

UNITED CHROMIUM, INCORPORATED
51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.

TRY THESE OTHER UNICHROME MATERIALS

Unichrome Quick Dry Stop-Off 323 — for chromium and other plating work requiring a stop-off that can be peeled off after use.

Unichrome "Air Dry" Rack Coating—a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions.

Unichrome Coating 202 — a new rack insulation similar to "Air Dry" but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

Unichrome Resist — a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

Wet Belt Surfacer

Now all the advantages of the Wet Belt Machining may be applied to line contact grinding and polishing as well as platen machining in a new machine, model WG-4, developed by Porter-Cable Machine Co., Dept. MF, of Syracuse, N. Y.

Much has been achieved in increased production per man hour and in the economy of operating through the use of the abrasive belt. Many jacks have been converted to the use of the abrasive belt by installing an idler to which the abrasive belt runs. The operator works on a resilient wheel over which the abrasive belt operates. Bench type units, including the idler, have also become popular on both line contact and platen grinding.

The reasons for increased production and economy are several, i. e.: the abrasive on the belt is exposed for action; the resiliency of the contact roll permits the abrasive to dig in and get the job done quicker; the resiliency eliminates chatter, and since the abrasive belt, a uniform factory product and the contact roll are balanced, the results are easily controlled.

An accurate platen is located immediately above the contact roll convenient for grinding flat and square after removing stock over the contact roll.

However, heretofore, line contact grinding and polishing was available only in a dry machine. The heat and dust cause many complaints and costly delays. The dust is injurious to health and equipment. The heat generated causes distortion, warping, checking, cracking, etc.; it also turned over a burr.

Wet Belt operation eliminates these disadvantages. The cool operation speeds the cutting, prevents loading of the belt, eliminates burring operations.

Shot Blasting

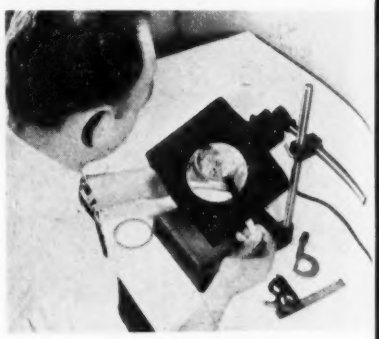
A new shot blast for cleaning stainless steel castings, forgings and other products is announced by The Cooper Alloy Foundry Co., Dept. MF, Hillside, N. J. It consists essentially of the use of stainless shot instead of the usual steel shot which deposits a corrodible film of iron on the casting or other product being blasted. This action affects one of the most valuable properties of stainless steel—its resistance to corrosion and oxidation. The use of stainless shot avoids this deposit of corrodible metal and allows the product to be cleaned down to bright rust free metal.

Cleaning by this method is accomplished in the conventional manner using standard shot blasting equipment.

Although patented by Cooper in 1937, the process has been the subject of experiment and improvement since that time and is only now being offered to foundries and other concerns on a license basis.

All-Angle Magnifiers

Inspection work demanding careful scrutiny of small objects is performed more accurately and easily with Ullman C-Master magnifiers. Newest additions to this well known line are three recently developed all-angle, illuminated models. Two of these



are stand models and the third is a portable hand type. The lighting equipment of the Stand Model 410 and Portable Model 6 consists of four incandescent tubes which can be lighted two at a time or all four at once. Two fluorescent tubes are used in Stand Model 210. Shadowfree, compact, and easy to handle, all three models are ideal for continuous inspection where magnification plus light is required. A large, clear 4½ double convex lens, ground and polished magnifies all objects twice up. Squinting and eyestrain are eliminated, since these all-angle, swivel-action magnifiers provide undistorted view of work inspected. Strongly built of cast aluminum and steel with bronze bearings, these magnifiers have real value wherever it is desirable to magnify objects in the best possible light.

For complete information and prices, write Ullman Products Co., Dept. MF, 857 Fourth Ave., Brooklyn 32, N. Y.

Rack Coating

Korolac RX solution, used in covering plating racks either by itself or with Korosea

Avoid Ring And Commutator Cutting

use

KEYSTONE METAL-GRAPHITE *Brushes*

KEYSTONE Metal-Graphite Brushes practically eliminate ring and commutator cutting, due to their low friction characteristics. This fact, together with their high current carrying capacity, low contact drop and excellent lubricating qualities, has been instrumental in their remarkable success on slip ring and commutator applications.

The result of years of research and practical experience, Keystone Brushes are demonstrating their ability to meet the more recent requirements of higher current carrying capacity, less friction and lower operating costs. They are made to meet the requisites of the machine on which they will operate. Copper and graphite are carefully proportioned to assure dependable electrical energy at all times. The shunts are molded directly into the brush, establishing a perfect connection for maximum performance in motors and low voltage generators.

Prompt delivery of Keystone Brushes for standard makes of equipment can be made. Our Research Department and experienced engineers are prepared to assist you with recommendations for specialized applications.

Write today for our catalog and price list K-15.

KEYSTONE CARBON COMPANY, INC.

Manufacturers of Precision Molded Products

1935 STATE STREET, SAINT MARYS, PENNA.

Ingenious New
Technical Methods
Presented in the hope that they will prove interesting and useful to you.
LARGER DRILLS
SMALLER DRILLS
MAJESTIC DRILL SHARPENER CO.

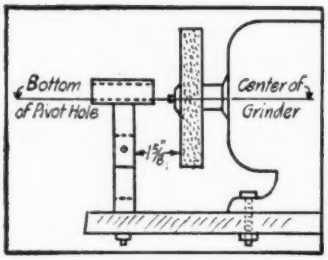
New Quick-set Dial Drill Sharpener Eliminates Guesswork...Keeps 'em Drilling Faster—Longer

Attached to the Drill Sharpener, it adjusts drill edges to the proper angle for precision grinding, putting drill sharpening on a quick, efficient basis.

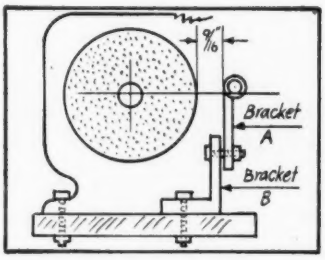
QUICK-SET DIAL easily and accurately adjusts Sharpener for sharpening drill from 5/32" to 1" sizes. Dial insures accuracy in measuring angles and clearances on twist drills, preventing trouble and making drills last longer. Dial-Set sharpened drills cut faster and more accurately, as the edges are alike and uniformly sharpened.

Precision built, calibrated and tested, unit is easy to set up and operate. Saves wear and tear on drill presses—prolongs drill life—cuts costs—improves quality—speeds output.

Another thing worth remembering is Wrigley's Spearmint Gum. That familiar red, white and green package which always meant "a help on your job." No more of this famous brand and flavor is being made for anyone now—even for the Armed Forces overseas—as Wrigley's stockpile of finest quality raw materials is all used up. But—remember Wrigley's Spearmint—The Flavor Lasts.



Front view of grinder



Side view of grinder

You can get complete information from Ameraco Industrial Specialties, 122 S. Michigan Ave., Chicago 3, Ill.

Z-59

Protective Clothing

A complete line of Ply-Garb clothing for men and women, affording protection against oils, acids, caustics, water, dust and fumes is announced by The Milburn Co., Dept. MF, Detroit, Mich., pioneers of skin protection in industry.

The improved and augmented Ply-Garb line includes sleeves, aprons, overalls, coveralls, slacks, jackets, cape sleeves and hi combinations, bolero jackets, caps and hoods. Each design is the result of extensive research in the field and each product has been put into production only after in-use tests provided factual performance data.

One of the chief advantages of Ply-Garb is that it affords maximum protection against every common hazard with a minimum of weight. In many instances, Ply-Garb is from two to five times lighter than any conventional garment for the same purpose.

Ply-Garb creations are fabricated from cotton or duck, specially processed with plastic. Ply-Garb is available in both single and double-coated fabrics for both ordinary and heavy-duty wear.

Each garment is designed to the recommended specifications of the United States Public Health Service, with additional exclusive features that assure complete comfort and remarkable durability. The versatility of these garments has opened hundreds of new fields of application.

In addition to the Standard Ply-Garb line The Milburn Co. offers a custom service preparing designs and samples to specifications to meet unusual circumstances or peculiar hazards.

Magnetic Comparator

The General Electric Co., Dept. MF, Schenectady, N. Y. has marketed a new magnetic comparator, which provides a quick, simple

Tape RX is now being made in white instead of the clear color originally furnished, it is announced by The B. F. Goodrich Co., Dept. MF, Akron, Ohio. Used as a stop-off lacquer, the white is clearly visible and the operator has no difficulty in determining just what portions of a part have been masked. When covering new plating racks the white lacquer shows plainly whether all parts of the rack have been covered.

The new white Korolac RX has the same chemical resistant properties as the clear type and gives a slightly heavier coat per dip. It provides a corrosion resistant, tough, inert coating with good insulating properties. Liquid at room temperature, it holds its position on the rack, after dipping or painting, because of shrinkage as the solvent evaporates.

Zinc Solution Purifier

Sulphur Products Co., Inc., Dept. MF, Greensburg, Pa., has announced the development of Zinc Brite, a new product for purifying zinc plating solutions. Zinc Brite is a liquid poured or sprayed into zinc plating solutions in the ratio of 1 oz. to 30 gal. It is claimed to precipitate heavy metal impurities and aids in producing a lustrous zinc deposit.

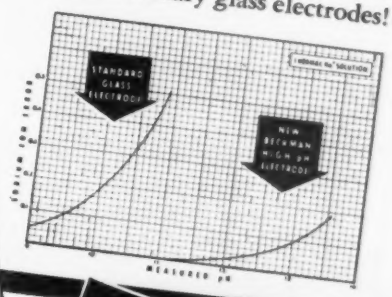
Further information may be obtained by writing to the company at the above address.

Check your knowledge of pH

Do you know the answers to these important pH questions?

Q. *There is only ONE make of modern pH equipment with which accurate pH measurements can be made in highly alkaline solutions, even in the presence of sodium ions. Do you know what that make is?*

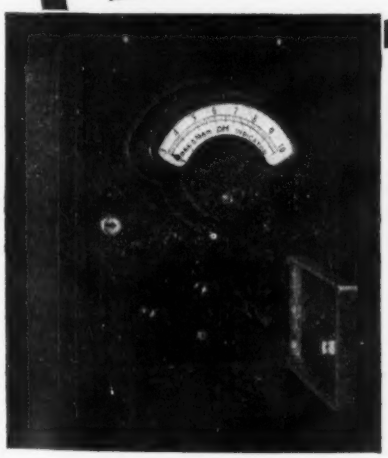
A. Beckman pH equipment—and *only* Beckman equipment! Note in chart the accuracy of Beckman Type E Glass Electrode in highly alkaline solutions compared with ordinary glass electrodes!



Q. *There is only ONE make of pH equipment with which glass electrode pH measurements can be made in boiling hot process solutions. Do you know the name of this equipment?*

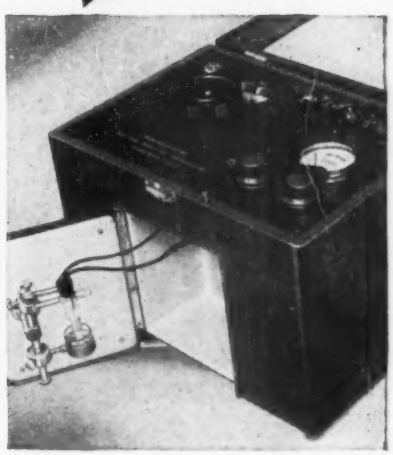
A. Again Beckman—and *only* Beckman! With Beckman High Temperature Glass Electrodes, continuous pH measurements can be made in solutions as hot as 100°C (212°F). This feature is highly important to consider in the purchase of pH equipment for *any* purpose. Even though your present operations may not involve hot solutions, you never know when changes or additions to your operations may obsolete equipment not providing this feature. Buy Beckman to begin with *and be sure!*

There's a Beckman pH instrument for your requirement.



Beckman Automatic pH Indicator
The most advanced pH instrument available for large-scale pH control. Indicates pH completely automatically. Also operates pH recording and control equipment!

Beckman Industrial pH Meter
Combines high accuracy with knockabout ruggedness for portable plant and field use. Gives instant pH readings at the touch of a button. Also *continuous* indication!



Beckman Laboratory pH Meter
Combines high precision with wide versatility to meet every laboratory and research need.

Free! "What Every Executive Should Know About pH"—a helpful factual guide to modern pH control. Send for your copy.

BECKMAN

BECKMAN INSTRUMENTS NATIONAL TECHNICAL LABORATORIES
South Pasadena • California

INSTRUMENTS CONTROL MODERN INDUSTRIES

A MASTERPIECE
OF PLATING RACK INSULATION

Master platers by the hundreds pronounce BUNATOL 720 a masterpiece of plating rack insulation.

Not just because of the way it stands up in strong alkali or acid plating solutions and hot cleaners but also for its long, trouble-free insulation life, whether used in plating Zinc, Tin, Cadmium, Copper, Silver or hard Chrome.

No. 720 cuts plating costs in many ways: saves time because easy to apply and easy to patch; saves money by eliminating rejects and current loss. Rinses freely without carry-over.

A few air dried coats of 720 will produce a heavy, tough insulation with unmatched chemical resistance yet is so flexible it will not crack or peel on spring contacts. Superior adhesion and cohesion make fewer coats necessary.

Put BUNATOL 720 in YOUR plating picture; let a trial gallon prove itself on your own plating racks. Remember this number: 720. Forget rack insulation grief.

NELSON J. QUINN COMPANY TOLEDO 7, OHIO

BUNATOL

non-destructive method of inspecting ferrous parts for quality control, has been redesigned to permit a more functional arrangement of its components, according to an announcement by the Company's Special Products Division. Desirable for testing rods, bolts, springs, and small fabricated parts, this portable equipment immediately discerns variations in composition, hardness, or other characteristics which affect magnetic properties.

Features of the redesigned comparator include an attractive new grey steel case with a sloping front panel on which are located the indicating instrument, variable-voltage transformer, and the necessary rheostats and switches. Graduated dial plates on the sensitivity and balance control rheostats have been added to allow duplication of settings. In addition, a light now indicates whether or not the power is on. Receptacles for making connections to the test fixtures and power source are now located at the back of the case, thus keeping wires out of the operator's way and allowing a clear view of the indicating instrument.

The redesigned instrument incorporates all the basic functions of the previous model. The circuit is balanced by placing an acceptable part in each of the two test fixtures. One of these parts is then removed and those to be tested are individually inserted. Any deflection of the instrument pointer indicates a deviation in magnetic characteristics from that of the standard.

Business Items

Dr. Donald Price

Dr. Donald Price, formerly associated wi the Interchemical Corp. and National Products Co., author of many technic papers on organic chemistry and well know for his research work on sulphonated oi wetting agents and detergents, has been a pointed technical director of *Oakite Product Inc.*, New York, manufacturers of specialize industrial cleaning materials. Dr. Price wi direct the activities of the company's chem cal and engineering staff and Researc Laboratory in connection with plans to e pand its technical service facilities to a branches of the metal working industry a in the further development of materials d signed for the improved surface preparati of metals. Dr. Price is vice-president of th *American Institute of Chemists*, council of *American Chemical Society*, member the Executive Committee, American Branc *American Institute of Chemists*, and vario professional societies.

The *Chemical Corporation*, 93 Broad S Springfield, Mass., has announced that W *Kenneth P. Bellinger* of Hartford, Conn has been elected a vice-president of th corporation.

William H. Safranek, Jr., has been a pointed to the staff of *Battelle Institut* Columbus, Ohio, where he will be engage in electrochemical research.

A former chemist at the Apollo Met Works, Clearing, Ill., Safranek holds a Bachelor of Science degree from the Un versity of Chicago. He is a member of th *American Chemical Society*, the *Americ Society for Metals*, and the *American El troplaters' Society*.

Peters-Dalton, Inc., manufacturers of dus collecting systems, spray booths, and indu trial ovens, announce that they are now lo cated at 17900 Ryan Road, Detroit, Mich

L. C. Camel, sales manager of the Alkali Division of *Detrex Corp.*, Detroit, has just announced the appointment of *W. H. Webb* to assistant sales manager. Beside alkali

W. H. Webb

and emulsion cleaning compounds, the company produces solvent degreasers, metal parts washers, chlorinated solvents, drycleaning machines and oil-extraction plants.

Mr. Webb will move to the Detroit office from Indianapolis where he was the manager of the Indiana Division. He joined the Detrex organization in 1942 and handled the Michigan territory, exclusive of Detroit until he went to Indianapolis. Mr. Webb was active in the major appliance field for a number of years prior to his association with Detrex, and brings considerable experience in metal cleaning and sales capacities to his new post.

Mr. Webb is a charter member of the Jackson-Lansing Branch of the American Electroplaters' Society and held the office of librarian of the chapter in 1942 and '43.

F. S. MacGregor, general manager, *Electrochemicals Department* of *E. I. du Pont de Nemours & Co.*, announces the formation of a *Technical Division* with *Donald O. Notman* as director.

In the new division, *Dr. C. W. Tucker*, formerly Peroxygen Products manager in the Sales Division of the department, will be chemical director. *Dr. Sterling Temple*, who has been chemical director of the department will be a special assistant to Dr. Tucker.

All research and semi-works activities of the Electrochemicals Department will be coordinated in the new Technical Division, with headquarters in Wilmington.

A native of St. Catherines, Ont., Mr. Notman was graduated from Queens University, with a Master of Science degree in chemical engineering, in 1922. Since then he has been engaged in research, production, and development activities with the *Roessler & Hasslacher Chemical Co.* and the Du Pont Company, which purchased Roessler & Hasslacher in 1930. For the past two years he has been on special duty in the Explosive Department.

Dr. Tucker, a native of Iowa, studied chemistry at the State University of Iowa and received his Ph.D. degree in physical chemistry at Cornell University in 1927. He joined Roessler & Hasslacher that year and for a period of ten years was engaged in research and production work at the Niagara Falls plant. For the past seven years he has been in charge of Peroxygen Products in the Sales Division of the Du Pont Electrochemicals Department.

Dr. Tucker will be succeeded as Peroxygen Products manager by *Dr. N. C. Jones*, formerly of the Production Division.

The *National Moulded Products Corp.* has moved its plant and offices to its new building at 592 Pacific St., Brooklyn, N. Y.

This move is the third in five years, from an original space of three thousand square feet, to seventy-five hundred square feet, and now to a new plant of twenty-two thousand square feet.

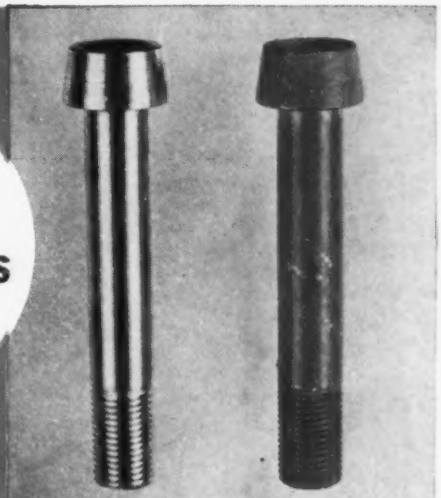
The operations of the corporation will continue to be in the line of metal finishing, which include spraying, enamel, baking, Bonderizing, Parkerizing, and caustic etching. In addition there is being installed a complete modern electroplating plant, which will then enable the corporation to offer complete metal finishing services under one roof.

The sales and technical developments remain under the guidance of *Leonard Wolff*, and production under the guidance of *Carl Samuels*. The appointment of *Nathaniel Fleet*, who has been a master electroplater for over twenty years, is announced to take over the operations of the electro-plating division of the corporation.

The need for Technologists in the Government service continues, it is announced by the *Civil Service Commission*. Vacancies

Case History Of Two Precision Bolts

Both given identical zinc plating four months ago. ONE given LUSTER-ON bright dip immediately after plating.



JUST LOOK AT THEM NOW!

These unretouched photographs, taken *four months after* the zinc plating and LUSTER-ON dip tell the graphic story of LUSTER-ON'S amazing brightening and protective qualities.

Both of these precision bolts have been handled equally, exposed side by side to the same conditions. But see the difference now! The ordinary zinc-plated bolt is darkened, fingerprinted, unattractive, while the LUSTER-ON treated bolt is bright and gleaming. No fingermarks mar its surface, no corrosion steals its luster.

LUSTER-ON gives the stable, passive surface of cadmium, with the appearance and tarnish-resistance of cadmium — yet LUSTER-ON can be obtained now and applied by cold dip to any zinc-plated part. LUSTER-ON even gives salt-spray protection!

KEMO SAYS: "Investigate the use of LUSTER-ON for your products as an economical, easy way of preventing fingermarks, aging and storing discolorations and corrosion. Send a sample part for free LUSTER-ON treatment."

THE Chemical CORPORATION
93 Broad St., Springfield 5, Mass.

THE CHEMICAL CORPORATION
93 Broad St., Springfield 5, Mass.

Please send me full particulars about Luster-on bright dip for zinc surfaces. I am (am not) sending sample part for free dip. No obligation, of course.

Name.....

Address.....

Metal Finishing—March, 1945

TO LICK FUME CORROSION—USE

TYGON

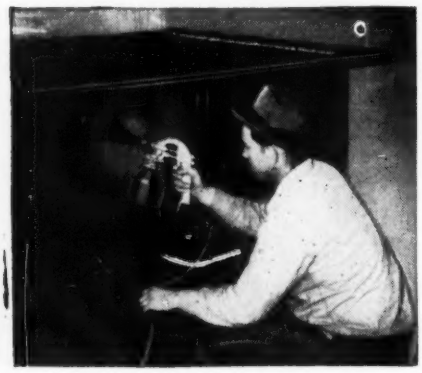
THE COLD-APPLIED PLASTIC

PAINT

A COAT of Tygon Primer and a few top coats of Tygon Paint applied to exteriors of tanks, pumps, fume hoods, ducts, pipe, exposed structural work—in fact, any place where danger of corrosion from acid spillage, gases or condensates is prevalent—gives lasting protection against almost all acids and alkalies.

Tygon Paint is a liquid formulation of Tygon sheet stocks, the rubber-like plastic used to line acid tanks. While thin (as any paint film) compared to a 3/32" thick Tygon lining, Tygon Paint possesses the same basic corrosion-resistant properties of Tygon sheet stocks. Tygon Paint films are tough and flexible. They are resistant not only to most chemicals but to water, oil, grease and alcohols. Like other Tygon formulations Tygon Paint is not subject to oxidation, will not chemically deteriorate with age.

Tygon Primers and Tygon Paints are applied cold with spray gun or brush. May be applied to any clean metal, wood or concrete surface. May be air-dried or baked.



Tygon Paint is available in white, black, clear, grey, green, red and aluminum. In requesting samples (available without charge for test in your own plant under your own conditions) please give full details as to the proposed use: corrosives encountered, temperature, and nature of surface.

U. S. STONEWARE

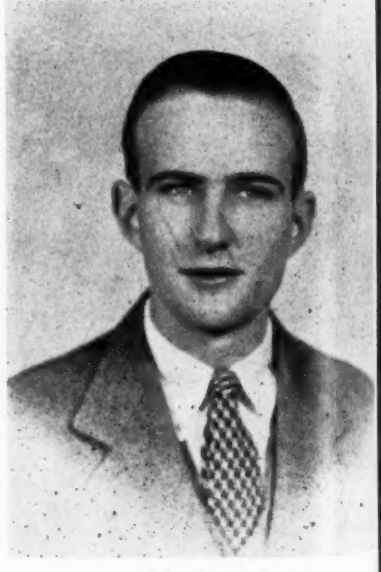
AKRON, OHIO

Arthur R. C. Markl

J. D. Mattimore, director of research and development for *Tube Turns*, Louisville, Ky., announces the appointment of *Arthur R. C. Markl* to the post of chief research engineer. Before joining Tube Turns, Mr. Markl was for fourteen years associated with the M. W. Kellogg Company, New York, last in charge of the development of equipment for oil refineries. He is a graduate of the Technical Institute of Munich and a member of the American Society of Civil Engineers.

Tube Turns manufactures seamless welding elbows and related welding fittings for the piping systems of a wide range of industries, among them: petroleum, chemical, shipbuilding, heating and refrigeration, chemical and processing.

E. W. Elkins, President of *International Rustproof Corp.* announces the addition of two young men in the Engineering Department of the company.



John R. Ford

John R. Ford attended Maury High School majoring in a technical course. He was

exist in Washington, D. C., and throughout the country in such agencies as the War and Navy Departments, the Department of Agriculture, and the Department of the Interior. The salaries range from $2,433 to $6,288 a year including overtime pay.

Technologists are especially desired who have had experience in testing, development, or production in the following industries: coal; food; fuel (liquids); paint, varnish, and lacquer; petroleum; synthetic resins and plastics; electrochemical; and process metallurgical. There will be no written test. For the lower grade positions, at least 3 years of experience in technology is required, unless appropriate education is substituted. Additional professional experience is necessary for the higher grades. There are no age limits.

Interested persons may secure copies of the announcement of these positions at the nearest first- or second-class post office, or by writing direct to the U. S. Civil Service Commission, Washington 25, D. C. The announcements contain complete information regarding the requirements and duties of the positions, and instructions for applying.

Federal appointments are made in accordance with War Manpower Commission policies and employment stabilization programs.

Walter Maynard Joyner

about to enter William and Mary College when he was called to the colors of the United States Coast Guard. He served sixteen months on foreign soil after which time he was given a medical discharge due to an injury. Mr. Ford has been thoroughly trained in corrosion engineering and plans to give personal attention and service in the Engineering Department.

Walter Maynard Joyner attended Belmont Abbey Preparatory School, Belmont Military College, Belmont, N. C., majoring in technical subjects. Well-qualified through training to give the friends of International Rustproof Corporation real service.

The plating industry's first new plant of 1945 got under way January 5th for the *Crown Rheostat & Supply Co.* of Chicago, and is expected to be ready for company operation by late winter or early spring.

The new plant will be located at 3449 N. Kimball Avenue, to which address the company will move from its present location at 1910 Maypole Avenue. By this move, Crown Rheostat becomes the first industry to locate in Chicago's newest industrial district, the Addison-Kedzie development. This is one of the five manufacturing districts owned and operated by a Chicago area locating firm, Clearing Industrial District, Inc.

The building transaction involved 68,132 square feet of ground, and a plant containing approximately 30,000 square feet of building space. Clearing Industrial District, Inc., has charge of building design and construction; this organization has located approximately 175 industrial plants in the Chicago area on a basis which includes site, design, construction, and financing on a long term lease or purchase contract.

Crown Rheostat was founded in 1914 by *S. E. Huenerfauth*, and is now under the direction of a son, *G. E. Huenerfauth*, president.

UNICHROME*

COATING 202

Gives Extra Protection in Strong Plating Baths

With Unichrome Coating 202 on your racks, even the toughest solution won't get to first base. Especially durable when force dried, it sticks to plating racks and fixtures *longer*—resisting even severe anodizing baths and strongly alkaline solutions. What's the reason? It's formulated of special resins that have shown maximum chemical resistance under actual shop conditions.

And although these resins are in great demand for other war uses today, there's been no change whatever in our formula. So start using this current-saving insulation now. Write for prices or a trial order.

* Reg. U. S. Pat. Off.

PROPERTIES

Chemical Resistance—Excellent for all plating cycles.

Toughness—Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

Drying—Dipped at room temperature in container in which it is shipped—force dried at 200°F. for extra protection.

Adherence—Excellent for severe cycles. For moderate cycles "Air Dry" Coating is recommended.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.

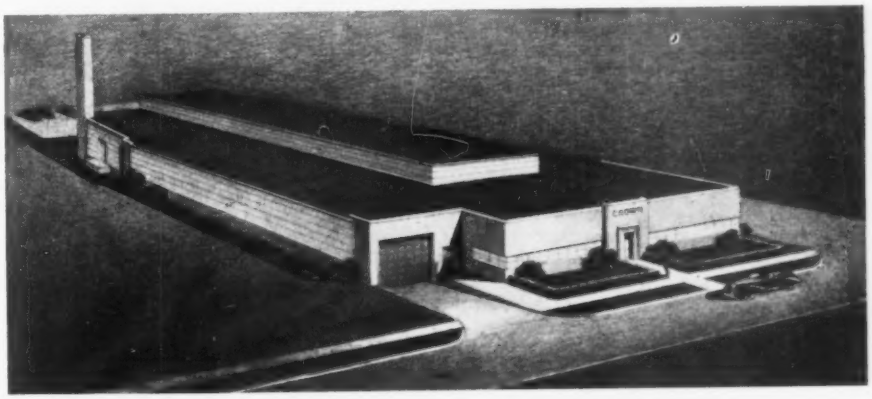
TRY THESE OTHER UNICHROME MATERIALS

Unichrome "Air Dry" Rack Coating—a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions.

Unichrome Quick Dry Stop-Off 322—for cyanide copper and other plating work requiring an extremely adherent stop-off.

Unichrome Quick Dry Stop-Off 323—for chromium and other plating work requiring a stop-off that can be peeled off after use.

Unichrome Resist—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.



This architect's sketch illustrates the plating industry's first new plant of 1945, now under construction for the Crown Rheostat & Supply Company.

THERE'S NO DOUBT ABOUT IT!

"PENOTRITE"
DEGREASING SOLVENTS

Clean Better and Faster

- RIGHT AT THE BENCH
- ALONG THE PRODUCTION LINE
- PRIOR TO PAINTING
- BEFORE PLATING
- FOR FINAL CLEANING

SAFE
ECONOMICAL

for complete information write

GENERAL SOLVENTS COMPANY
INCORPORATED
926 EXCHANGE ST. ROCHESTER, NEW YORK

The ABBOTT Method

★ TEST WORK REPORT
on your parts

for DEBURRING
TRY IT!

Parts of odd shapes and sizes, which seem to be a problem, are being successfully deburred by the ABBOTT Method. . . . The Abbott metallic materials are available in shapes and sizes to insure contact on practically all types of small parts. . . . Try the ABBOTT Method.

★ TEST WORK REPORT

Send a few unfinished samples of the parts to be Deburred and get our Test Work Report—it gives the facts—it's gratis.

THE ABBOTT BALL COMPANY 1046 NEW BRITAIN AVE. HARTFORD 10, CONN

Dr. D. Gardner Foulke

Dr. D. Gardner Foulke, recently chief chemist for the Garfield Division of Hoy daille-Hershey Corporation, has joined the staff of *Foster D. Snell, Inc.*, as Director of the Analytical Department.

Dr. Foulke received his B. S. degree from Juniata College, the M. S. and Ph. D. degrees from Rutgers University. He served as In structor in Analytical Chemistry at Rutgers University and as Assistant Professor in Analytical and Organic Chemistry at Beaver College. Subsequently he entered the indus trial field as analytical and research chemist with A. K. Graham Associates, leaving to become Assistant Chief Chemist in charge of the Analytical Laboratories of Republic Steel Corporation. In collaboration with Frank Schneider, Dr. Foulke has published a series of articles in Industrial and Engineering Chemistry, Analytical Edition, on "The Micro-Technique of Qualitative Organic Analysis." Currently a group of articles on "Colorimetric Methods as Applied to Electro plating Baths" is appearing in the Monthly Review of the American Electroplaters Society.

In his new position, Dr. Foulke will have complete charge of analytical work with the responsibility of developing necessary tech niques for new and unusual types of analyses.

Promotion of several executives and addi tions to the staff of *United Platers, Inc.* of 944 Madison Ave., Detroit, Mich., are announced by *Glenn H. Friedt*, president and general manager.

James J. Malone, who served the firm in various capacities during the past 10 years, was advanced to the post of assistant general manager. He had charge of the sales divi sion, prior to the war. He holds member ship in the Detroit Branch of the A. E. S. and the *Plating and Rustproofing Associa tion* of Michigan.

Edward W. Tawyea, has been promoted from superintendent to general superintend ent. He has been associated with United Platers for 18 years during which time the firm progressed from a small organization to one of the largest job plating plants in Michigan.

George D. Blair, formerly assistant sales

James J. Malone

manager, was made manager of the sales division. He has been with the company for seven years. Prior to our entrance into the war he had completed plans to convert the sales staff into a service organization to expedite the flow of critical war materials to war plants.

W. Meyer, previously office manager, has been promoted to comptroller.

Clarence Norris, who was associated with the U. S. Rubber Company for the past 16 years, has been added to the technical staff of United Platers, Inc. Mr. Norris conducted extensive research work on the rubber to metal adhesion process through the medium of brass plating which method is now being largely used on heavy war equipment for elimination of vibration.

Promotion of *Walter E. Kolemainen*, to the post of assistant superintendent, also was announced. He holds a degree in chemistry from St. Olaf's College, Minn., and is a post graduate of Wayne University. He was a former superintendent of Westinghouse Naval Ordnance.

The Board of Directors of *Skilsaw, Inc.*, Chicago, manufacturer of portable electric Skiltools, has recently promoted *E. J. Kelley* to the office of vice-president in charge of engineering, and named *J. L. McManus* secretary of the company. Mr. Kelley was formerly secretary and for many years has directed engineering and new product development. Mr. McManus, an attorney, has been promoted to his new position from that of director of purchases. The directors also announced the election of *E. B. McConville*, treasurer, to membership on the board. All three men will continue to serve on the operating committee.

Ralph J. Cordiner has been elected Vice President and Assistant to the President of the *General Electric Company* with general administrative duties as designated by the President, it has been announced by *Charles E. Wilson*, President. Mr. Cordiner has been Assistant to the President for the past 18 months, since his resignation as Vice Chairman of the War Production Board.

A former member of the G-E Appliance

Announcing

PR

THE NEW MATERIAL WHICH MAKES FOR QUICK EASY CLEANING OF SPRAY BOOTH WALLS

Triad PR is a protective coating for the sidewalls of spray booths which permits easy removal of paint overspray. A coat of Triad PR cuts cleanup time to minutes—reduces maintenance costs to a new low.

✓*Check* **THESE ADVANTAGES**

✓Readily applied with brush or spray gun; gives excellent coverage.

✓Dries to a hard, white, dustless coating; improves visibility in the booth.

✓Quickly washed off with water or steam, carrying all surface deposits with it.

✓GUARANTEED PERFORMANCE: As with the entire line of Triad alkali cleaners, PR is shipped on a guaranteed performance basis for thorough testing in your equipment.

KEEP BUYING U.S. WAR BONDS

DETREX CORPORATION

13009 HILLVIEW AVE., DETROIT 27, MICHIGAN

Branch offices in Principal Cities in U. S. A.

Ralph J. Cordiner

and Merchandise Department, Mr. Cordiner has been continuously connected with the electrical industry since his undergraduate days at Whitman College in Walla Walla, Washington, when he was employed part-time as an electrical appliance salesman by the Pacific Power and Light Co.

The *C. J. Tagliabue Mfg. Co.*, pioneers in the manufacture of Industrial Control and Laboratory Instruments, has sold its assets, including goodwill, name and patents, to the *Portable Products Corp.* of Pittsburgh, Pa.

The research and development policies in electronic and mechanical instrumentation which for so many years have characterized the Tagliabue organization will be continued under the local management and personnel that has made Tag a well known name in industry.

The business will be operated as a separate division of the *Portable Products Corp.* Among the interests of the latter are manufacturing plants in Newburgh, N. Y., Philadelphia and Pittsburgh, Pa.

The *Cowles Detergent Co.* of Cleveland, Ohio, has announced to its employees the establishment of an *Employees' Profit Sharing Trust.* The Trust which became effective for the year 1944 has received government approval and will benefit all employees who are compensated on a straight salary, or salary and commission, or straight commission basis.

To become eligible for participation in the plan, an employee must complete two years of continuous employment unless granted a leave of absence by the company. Employees in the Armed Forces are deemed to be on a leave of absence so that this does not effect their eligibility under the plan.

There are no deductions from the employees' compensation as the entire cost is paid by the company. Briefly, the plan provides that a predetermined return on the net worth of the company shall first be deducted from the yearly profit, computed before federal income and excess profits taxes, and 20% of the remainder shall be placed in trust for the eligible employees. Allocation of this fund to the individual participants is made on the basis of the ratio of their annual income to the total income of all participants. The fund is being administered by the Cleveland Trust Company as Trustee, and a committee of three employees appointed by the directors of the company. Income from investments of the trust funds accrues to the credit of the participants.

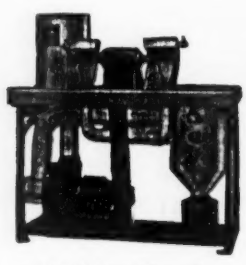
Distribution of the fund is made to each participant upon retirement either in a lump sum, deferred payments or in the form of an annuity insurance policy. Participants leaving the employ of the company after completing ten years of participation under the plan receive their full equity in the trust. Those leaving before completing ten years participation sacrifice a portion of their equity depending on the length of their employment.

The contribution to the trust for the year 1944 amounts to a substantial portion of each participant's income for that year. The benefits from this trust plus those provided by the federal social security program should provide an adequate retirement income for Cowles' employees who have been eligible to participate in the plan.

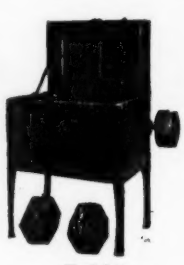
Since air and water hose in industrial plants and other places are very often used with spray guns, nozzles, and hand-operated valves, The B. F. Goodrich Co., Akron, Ohio, is adding to its line of industrial hose a complete series of Lonn blow guns, whose fingertip-control is made possible by the use of rubber.

This announcement by *E. F. Tomlinson*

Blower


Polishing Bench

Dryer


Tubbing

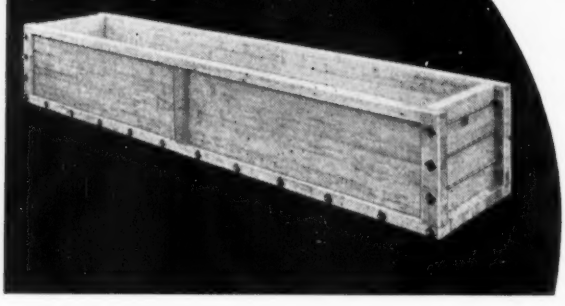
Sawdust Box

Sandblast

THE BOLAND SYSTEMS FOR FACTORY INSTALLATIONS
Tanks, Coloring Rooms, Dynamos, Sawdust Boxes

H. J. ASTLE & CO., INC. Established 1884 (Send for Catalogs) 118 Orange St., Providence, Rhode Island

Wood Tanks for Plating and Pickling



Excellent service on all types of Wood Tanks.

The shortage of metals has increased the demand for wood tanks for plating and pickling service. We can give excellent service on all types of tanks. Send us your inquiries.

Kalamazoo TANK & SILO CO.
KALAMAZOO - MICHIGAN

general manager of B. F. Goodrich Industrial Products Sales Division, reveals that the company will handle exclusively, through distributor channels, nation-wide sales of these valves made by the *Lonn Mfg. Co.*, Indianapolis, Ind.

Lonn blow guns are known as Air Savers and Water Savers because of their ability to exercise a positive control over air or water flow and thus reduce consumption of water and compressed air.

Air Savers, Water Savers, and Spray guns are offered in several styles with various degrees of flow or restricted flow.

Among the largest users of Lonn valves are dairies, meat packers, breweries, food processors, service stations, automobile washracks, garages, machine shops, and general industrial operations including paint spraying where air or fluids are used under pressure.

The Lonn valve features an internal trigger principle and involves only three simple working parts. It is opened and closed without the use of springs, levers, or pushbuttons, merely by flexing the rubber nozzle or hose.

The *Daniels Plating Barrel Co.*, 129 Oliver St., Newark 5, N. J., manufacturers of the Daniels Plating Barrels, announces the appointment of the *Enthone Co.*, 444 Elm St., New Haven, Conn., as their exclusive Sales Agents and Distributors of the plating barrel equipment in the New England territory. The territory embraced by this agreement includes Maine, New Hampshire, Vermont, Rhode Island, Massachusetts, and Connecticut.

The Enthone Co. maintains complete laboratory facilities staffed by efficient technicians to supplement sales and equipment of the Daniels Plating Barrel equipment.

A pension trust fund for all wage and salaried workers of the *Park Chemical Company*, at no cost to any employe, has received U. S. Treasury approval and is being instituted immediately, *W. P. Woodside*, Board Chairman of the firm located at 8074 Military Avenue, Detroit, announced. Mr. Woodside also said that benefits under the plan would date from the spring of 1944, when Treasury approval was asked.

The plan provides an annuity and life insurance policy, with full premiums paid entirely by the company, for all employes whether porters, bench hands or top executives. They automatically become eligible for the benefits after three years of continuous service with the company.

Obituary

Charles Burgess

Charles Frederick Burgess, chemical engineer and founder of the *Burgess Industries*, including the *Burgess Battery Co.*, died February 15, 1945, in Presbyterian Hospital after a brief illness. His age was 72.

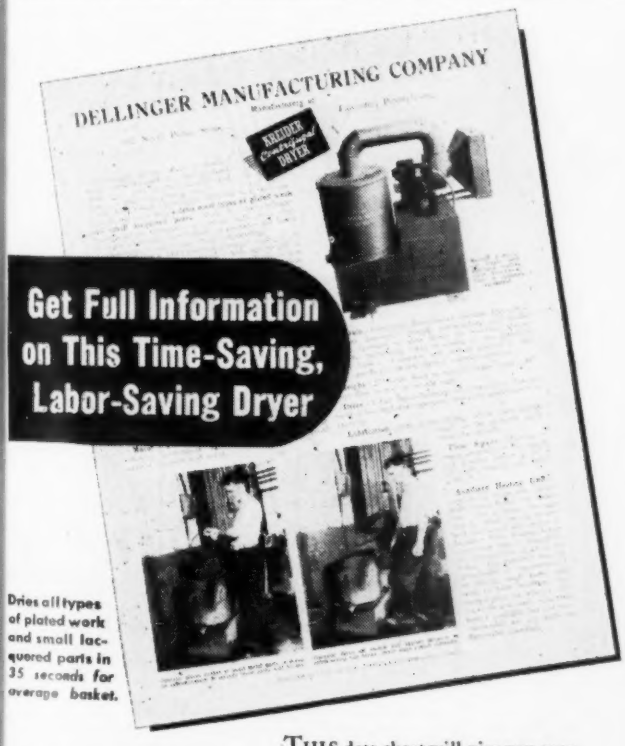
Born in Oshkosh, Wis., Mr. Burgess received an honorary degree of Doctor of Engineering last year from the Illinois Institute of Technology. He was Professor of Chemical Engineering at the University of Wisconsin for many years, resigning in 1913 to become a manufacturer.

Mr. Burgess received a Bachelor of Science degree from the University of Wisconsin in 1895, and two years later added a degree in electrical engineering. He was professor at the university from 1900 to 1913.

In addition to a process for the electrolytic purification of iron, Mr. Burgess invented various iron alloys and improvements in dry cells; taking out more than forty patents covering various products and processes. The Western Society of Engineers awarded to him the Chanute Medal in 1911, and in 1932 he received the Perkin Medal of the American section of the Society of Chemical Industry for "distinguished services in the field of applied chemistry." In the course of his speech accepting the latter honor he displayed, at a gathering in the Hotel New Yorker, a new product of his laboratories, a brick that floated, weighing one-fifth as much as an ordinary brick.

Mr. Burgess was a former president of the American Electrochemical Society, and a member of many other scientific societies.

He leaves a widow, a son, Jackson, president of the Thordarson Electric Manufacturing Company, and a daughter, Mrs. Betty Burgess Cotton of Hinckley, England.


DELLINGER MANUFACTURING COMPANY
KREIDER Centrifugal DRYER
Get Full Information on This Time-Saving, Labor-Saving Dryer
Dries all types of plated work and small lacquered parts in 35 seconds for average basket.

THIS data sheet will give you complete specifications on the fast, economical *Kreider Centrifugal Dryer* —the modern drying outfit that speeds production . . . improves plating quality . . . requires only one operator. *Write for it today.*

DELLINGER MANUFACTURING COMPANY

727 N. Prince Street — Lancaster, Pa.

Now for EVERY WORK SHOP!

NEW Invention **Electroplates by BRUSH**

Easy to Plate CHROMIUM

GOLD, SILVER, NICKEL, COPPER

. . . For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc., with a durable sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE!

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MICRO SYSTEM FOR PROCESS CONTROL

BY USING a solenoid-loaded contact tongue, with the pull of the solenoid governed by a rheostat on the valve motor shaft, the Microtherm (lower picture) is able to position the Proportioning Valve (upper picture) so as to satisfy exactly any change in demand. Features include simple construction, no relays, and maximum power at all points of valve stroke. "Hunting" is eliminated and the valve is positioned quickly with "micrometer accuracy."

Write for Bulletin
"CONTROLS FOR INDUSTRY"

BARBER-COLMAN COMPANY
1205 ROCK ST. • ROCKFORD, ILL.

McKean's

"TIN STRIP"

A simple, safe way to remove tin deposits.

No current
No etch

Try a gallon on approval.

Sulphur Products Co. • Greensburg, Pa.

Associations and Societies

American Electroplaters' Society
Toronto Branch

In extremely sloppy weather Feb. 9th 150 members and guests attended an open meeting of *Toronto Branch*. It was 8:3 when President *Allen Byers* called the meeting to order. Ordinary items of business were dispensed with. One application was read. Upon recommendation of the entertainment committee the Euchre Party usually held about March 17th will be cancelled this year.

Mr. T. A. Stroud, of Sydney, Australia Branch was introduced and given a rousing welcome. Mr. Stroud expressed sincere appreciation of the courteous, friendly reception given him in the United States and Canada. He spoke with particular emphasis about the efficiency of Canadian practice in electroplating. *Sydney Branch*, he said, has a membership of about 45 and the restrictions governing qualifications for membership are very rigid, as a result of this Sydney Branch is composed of Australia's "Super-best" foremen platers.

The scheduled big feature of the evening was a very interesting and instructive talk by *Mr. Wm. Phillips*, Chief of Electrochemistry Division, Research Laboratories, *General Motors Corp.*, Detroit, Mich. The subject was "Plating in Motion." By means of a unique method of projecting upon a screen the actions at both cathode and anode in a miniature plating bath contained in small glass tanks, the audience was afforded a splendid opportunity to see what actually takes place during electrodeposition in the various solutions chosen for the demonstration.

Mr. Phillips was assisted by *Mr. Clifton* of the G. M. Corp. and the baths shown included alkaline cleaning, sodium sulphate cyanide copper, sulphate copper, nickel baths of high and low pH, and a chromium plating bath.

Mention of stress strains which cause cracks in chromium plate and which have developed into what is now known as porous plating, was particularly interesting. A cathode lacquered on one side was placed in the chromium bath and the effect of stress strain was seen as the cathode curved due to accumulation of metal upon the unlacquered side.

Effects of addition agents were illustrated by use of a fluoborate bath without addition agent, and after addition of glue.

In addition to the talk and screen pictures relative to "Plating in Motion," Mr. Phillips showed a reel of technicolor "movies" depicting the careful preparations prior to adoption of a grill design for a car. Operations during fabrication and finishing of the grill were shown. The rapidity with which the plating was illustrated might well cause Mr. Public to imagine the operation to be simply a dip. In the section showing a chemist at work we saw one of the most

generous "end points" we have ever seen. Mr. Phillips suggested that Toronto Branch might be doing speakers from the U. S. a favor if the Canadian Customs officials could be induced to become students in electroplating. These fellows evidently caused "Bill" plenty of grief, but he finally got through with only a few minor casualties.

A rising vote of thanks and loud applause was tendered Mr. Phillips for his efforts.

The meeting adjourned at 10:30 but groups discussed problems for another hour. Feature for March meeting will be "Bright Nickel Plating," by a representative from *McGean Chemical Co.*, Cleveland, Ohio.

W. S. Barrows

Newark Branch

The *Newark Branch* of the *A. E. S.* wishes to announce that due to prevailing conditions the annual banquet, which was to be held on April 7, 1945, has been cancelled.

The *Educational Session*, which was to precede the banquet, will be held on Friday, April 6, 1945, at 8:30 P. M., at the Robert Treat Hotel in Newark, N. J. This Spring Educational Session, under the sponsorship of the Educational Chairman with the aid of the committee, will furnish you, as several past open meetings of this type have proven, with valuable information on pertinent subjects. The Branch has been fortunate in securing the following three outstanding speakers who are well qualified to make the evening entertaining and informative:

George B. Hogaboom, Sr., Consultant, New Britain, Conn. Subject: *What Specifications Have Taught Us About Electroplating.*

Andrew Wesley, International Nickel Co., Bayonne, N. J. Subject: *To be announced.*

W. B. Sample, Bell Telephone Lab., New York, N. Y. Subject: *To be announced.*

The members of the Newark Branch wish to extend a cordial invitation to anyone engaged in electroplating and its allied industries to attend this meeting.

W. F. Bruhns

Los Angeles Branch

Marshall Wells of the lamp division, *Westinghouse Electric Co.*, presented a talk on "Illumination" as the feature of the educational session of Los Angeles Branch's

ECONOMICAL, DECORATIVE
SPEKWITE
QUALITY PLATED FINISH

Tarnish Resisting...Faster Plating...Lustrous Finish

SPEKWITE plates quickly and directly on nearly all metals, and covers hard solder and most soft solders. Soldering and welding are easily accomplished on SPEKWITE plated work. Extremely high throwing power enables it to penetrate deep recesses. Used extensively on Government work. SPEKWITE has high salt spray resistance (about 1½ times nickel for same thickness), and is *non-magnetic*. Articles can be formed after plating without cracking or peeling. Plating can be controlled by plater at tank, or by laboratory. Ideal for plating in a steel tank, basket and barrel. *Economical*—only 1 lb. of SPEKWITE plates about 100,000 sq. in. minutes of work. Reflectivity is high—82% of silver.

ORIGINAL PATENTED TRI-METAL ALLOY PLATE OF COPPER, ZINC AND TIN. No royalties or license fees. Covered by U. S. Patent No. 2,079,842 issued May 11, 1937 ON WHITE ELECTROPLATE

DRASTIC NEW REDUCTION IN PRICES
afforded by considerable savings in manufacturing costs. SPEKWITE costs less than nickel plating for the same thickness.

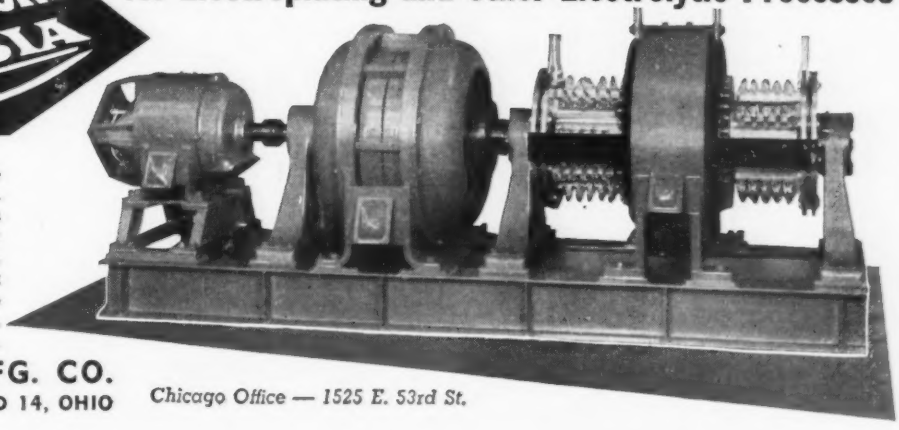
SPEKWITE (Patented)

WRITE FOR LITERATURE

Data sheets describing SPEKWITE in detail—advantages, properties, characteristics and price—will be sent promptly on request. There is no obligation.

SPEC SPECIAL CHEMICALS CO.
34 IRVING PLACE NEW YORK 3, N. Y.

MOTOR GENERATORS by COLUMBIA
for Electroplating and other Electrolytic Processes



Columbia Generators embody every feature essential for dependable, 24-hour operation. They are built for electroplating service in sizes of 6 to 20 volts, 500 to 20,000 amperes, for anodic treatment of aluminum in sizes of 40, 50, and 60 volts, 500 to 3,000 amperes. Columbia Generators for other electrolytic processes range from ½ to 250 KW, 100 to 40,000 amperes, 6 to 60 volts. Write for full information.

COLUMBIA ELECTRIC MFG. CO.
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Chicago Office — 1525 E. 53rd St.

In the new Globe Tumbling Barrel Catalog, partially illustrated above, you will find the final solution to your finishing problems. It contains complete information about the nine different types of Globe Barrels in their various sizes and capacities. You will find that there is a Globe Tumbling Barrel for almost every type of finishing operation—de-burring, burnishing, polishing, painting, japanning, or drying. All of them are designed to provide finer finishing at less cost. This new catalog plus Globe's Finishing Service Department are waiting to serve you. Write today!

Here Are Seven Ways That Globe Tumbling Barrels Will Reduce Your Finishing Costs

1. You can process thousands of pieces at one time.
2. You do not need specially skilled labor.
3. One man can operate several barrels simultaneously.
4. The purchase price of Globe barrels is low.
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6. Your operating expense is mainly power consumption which is negligible.
7. You obtain superior results.

THE GLOBE
MACHINE AND
STAMPING CO.
CLEVELAND 2, OHIO
A DIVISION OF
HUPP MOTOR
CAR CORP.

For Lustrous Sulphide Blacks on Copper Alloys

USE

McKean's

"BLACK'NBRASS"

Low temperature operation.

SINGLE BATH **NO CURRENT**

TRY A GALLON ($3.00) ON APPROVAL

Sulphur Products Co. • Greensburg, Pa.

meeting held February 12 in the Ros Hotel.

Briefly discussing lighting systems for pl ing shops, in the course of which he emp sized adequate illumination as essential efficient plating plant operation, Mr. W devoted the major portion of his lecture a discussion of new types of lamps wh will be introduced for home and factory in the postwar period. Many plants, t speaker said, are definitely under light He cited several instances in which illumi tion engineers, by making only slight chan in lighting power, had substantially creased shop output.

Among new types of electric lamps veloped during the war years, and wh will be available for civilian use after t war, the speaker discussed sealed-beam hea lights, a new type of infra-red drying la and a "baby" fluorescent, so small, compa and durable that it can burn for three ye without wearing out.

He cited as the greatest development lamps during the war a gunsight lamp i use in optical gunsights which throws beam ahead of the plane to "spot" the coming enemy planes. This lamp, the speak said, has been one of the principal reas for the phenomenal success of Americ flyers against the Japanese. He told a of a sea rescue lamp, and exhibited a samp which works off a small generator and pr duces a ray visible for 25 miles at sea.

Mr. Wells gave an interesting demonstr tion of how the interior of a lamp bulb aluminum coated. With strips of alumin fastened to the base of the filament, t turned on the current and the interior the globe became coated with aluminum less than three seconds.

A motion picture showing the import role steel plays in the war was shown at t conclusion of the talk.

The business session was presided over Branch President *Joseph Sunderhaus*. A plications for membership were receiv from *Charles Stoughton*, USMC, San Dieg and *John Hodges*, Hodges Supply Co., L Angeles.

E. L. Lamoreux reported that *Fred Green* of the *Rheostat & Supply Co.*, Chica had been obtained as an additional speak for the branch's annual educational sessi on March 24, supplementing *J. S. Hitchc* of *Poor & Co.*, Waukegan, Ill., and *James, Udylite Corp.*, Detroit, previous announced.

A report by *Marcus Rynkofs* on the pro ress of the branch directory and program first to be compiled by Los Angeles Bran in 15 years—disclosed that a booklet more than 100 pages, listing some 300 Pacif Coast plating plants and incorporating wealth of technical data on solutions, pro esses, plating and cleaning techniques w expected to be off the press in time f distribution at the annual educationa session.

33RD A.E.S. CONFERENCE POSTPONED

On Monday, February 12, 1945, the *Pitts burgh Branch* of the *American Electroplaters Society* was officially notified by the *Offi of Defense Transportation* that the applic

town to hold a National A. E. S. Conference in Pittsburgh during the month of June, 1945, had been rejected.

Therefore, in accordance with the policy of the organization to cooperate fully with the Government, Pittsburgh regretfully announces that all plans for holding the 1945 Convention have been summarily abandoned.

However, Pittsburgh regards this as a postponement and not a cancellation and desires the privilege of being host at the first Annual A. E. S. Conference after O. D. T.'s ban is lifted.

A meeting of the Convention Committee is scheduled and any important developments transpiring at the session will be announced at the earliest possible date.

W. J. Hennessy.

The Electrochemical Society, Inc.

Revised Program — Atlantic City Congress

With the approval of the Board of Directors, the order of the scientific-technical sessions at the Atlantic City Congress has been changed. The Session devoted to Theoretical Electrochemistry is now scheduled for 2:00 p.m. on Thursday, April 12th. The two sessions on Friday, April 13th, will be in charge of the Corrosion Division, and the Electronics symposium will be held on Saturday morning and afternoon, April 14th.

Chairman Ernest G. Enck of the Local Committee reports the revised Program as follows:

Wednesday, April 11, 1945

8:00 to 10:00 p.m.—Registration.

Thursday, April 12, 1945

9:00 a.m. Registration continued.
10:30 a.m. Meeting of the Board of Directors.
11:00 a.m. Annual Business Meeting of the Society.
12:00 noon Luncheon—Speaker to be announced.
2:00 p.m. Scientific-Technical Session on Theoretical Electrochemistry, *Dr. J. F. Gall* presiding.
7:00 p.m. Informal, get-to-gether dinner. Details to be announced.

Friday, April 13, 1945

7:30 a.m. Group breakfasts.
9:00 a.m. Registration continued.
9:00 a.m. Scientific-Technical Session on Corrosion, *Dr. H. H. Uhlig* presiding.
12:00 noon Luncheons of the Divisions. Luncheon address by *Mr. George B. Hogaboom.*
2:00 p.m. Second Session on Corrosion, *Dr. H. H. Uhlig* presiding.
6:30 p.m. Reception to the new President.
7:00 p.m. Annual Banquet. Presidential Address by *Sidney D. Kirkpatrick.* Award of Prizes.

Saturday, April 14, 1945

7:30 a.m. Group breakfasts.
8:00 a.m. Registration continued.
9:00 a.m. Scientific-Technical Session on Electronics, *Dr. M. E. Fogle* presiding.
12:00 noon Luncheon. Address by *W. J.*

YOU, TOO CAN WIN NEW POLISHING PROFITS

. . . JUST LIKE THESE USERS OF GRIPMASTER, THE ENTIRELY *NEW KIND* OF POLISHING WHEEL CEMENT

"Gripmaster is best cement we have ever used." J.E.C., Fargo, N. D.

"Since using Gripmaster we have no chipping or glazing problems." B.N.F., Toronto, Ont.

"Have found Gripmaster very good. Count on us." G.K., Omaha, Nebr.

"Most important . . . we now only have to stock one grade." H.B., Cleveland, O.

"Gripmaster is great . . . Has increased our output." W.S., New York, N. Y.

STEP UP *Your* PRODUCTION . . . AVERAGE OF 47% MORE PIECES PER HEAD

A FREE SAMPLE of Gripmaster—yours for the asking—will show you how this amazing *new kind* of polishing wheel cement lengthens wheel head life, gives better finishes, reduces rejects. Gripmaster ends glazing and chipping problems. Simplifies inventories, too. One grade grips *all* grains—250 to 20. **Write for FREE SAMPLE today!**

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GRIPMASTER DIVISION: MICHIGAN BLEACH & CHEMICAL COMPANY 1944 EAST WOODBRIDGE, DETROIT 7, MICH.
IN CANADA: NELSON CHEMICAL COMPANY, WINDSOR, ONTARIO

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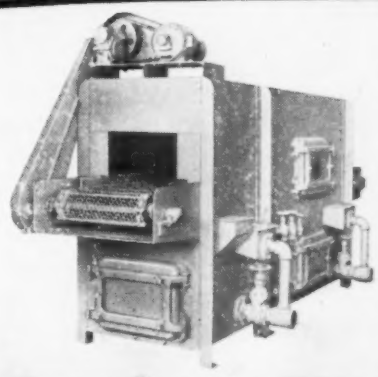


THIS Alvey-Ferguson "standard" cleaning unit *thoro-cleans* small metal parts and products without the use of baskets. (Chain guard was removed to show drive mechanism.) Perhaps it, or an especially designed unit, will help you secure quality control, fewer rejections and lower production costs. Write today:

THE ALVEY-FERGUSON CO.
693 Disney St. Cincinnati 9, Ohio
Offices in Principal Cities—Coast to Coast

CONVEYING EQUIPMENT
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

Cotton, Chemical Reactions in the High Frequency Field.

2:00 p.m. Second Session on *Electronics, Dr. M. E. Fogle* presiding.

4:00 p.m. Round Table Discussions: *Primary Batteries, Fused Electrolytes.*

6:30 p.m. Adjournment.

The Local Committee is making arrangements for exhibits at the Congress and will welcome displays of equipment of interest to electrochemists. Manufacturers who wish to place their products before the members and guests of the Society at its forthcoming meeting are asked to communicate with *Ernest G. Enck*, Redstone Farm, R. D. No. 1, Hatfield, Pa.

American Zinc Institute
Galvanizers Committee

The *Galvanizers Committee*, which is sponsored by the *American Zinc Institute*, has just announced that the usual Spring meeting of the Committee will not be held this year.

While meetings of the Committee deal with technical subjects closely related to war production, it was decided to comply not only with the text but also with the spirit of the new regulations designed to conserve transportation and hotel accommodations.

News from California
By FRED A. HERR

Max Goldring has been placed in charge of the plating department of *Deluxe Plating Co.*, Los Angeles, which in January was taken over from Gene Bedwell by Edward Gill and Robert Dettard, operators of Trophy-Craft Co. of Hollywood.

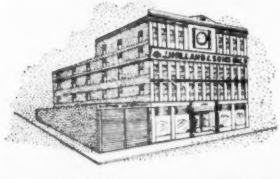
Mr. Goldring had served in the Trophy-Craft plating department from 1933 to 1942, when he severed his connection coincident with the firm's curtailment of metal finishing activities. In the interim he was affiliated with Memley Plating Co., Los Angeles.

After 25 years at 2600 South San Pedro St., Los Angeles, the *Hill Electric Co.* on February 15th moved into larger quarters, embracing 12,500 sq. ft. of floor area, at 580 Mateo St. The firm was established in 1920 by *Sid F. Hill* and since that time has served the Southern California Plating Industry as a supplier of motors, generators, repair and maintenance service for shop equipment in general. The company also provides technical advice on proper illumination of shops.

A visitor to the Pacific Coast in February was *L. R. Eastman*, chief chemist and manager of the composition department, *Frederic B. Stevens, Inc.*, Detroit, Mich., manufacturers of plating equipment and hol compositions.

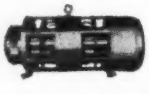
Accompanied by Mrs. Eastman, he sp two weeks in Los Angeles on a combina business and pleasure trip, and subseque devoted a week each in San Diego and Francisco to conferences with indus members.

"THEY SAY THINGS ARE GETTING REALLY TOUGH BACK HOME. A GUY HAS TO SHARE HIS CAR IN ORDER TO GET GASOLINE FOR DRIVING TO WORK."



J. HOLLAND & SONS, Inc.

Electroplating and Finishing Equipment and Supplies



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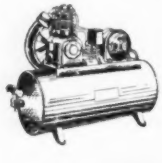
All Sizes and Types
Rheostats 50-1500 amperes with or without meters.

V-DRIVE POLISHING LATHES
Sizes 3-15 horsepower. Complete unit is ball-bearing, totally enclosed, Sturdy construction.



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Spray guns, Air compressors, Spray booths and complete paint finishing units. Baking ovens.

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TEMPERATURE and HUMIDITY
CONTROL

When you want accurate and dependable automatic temperature or humidity control for Industrial Processes or Air Conditioning Systems call in a Powers engineer. With a very complete line of self-operating and compressed air operated controls we are well equipped to fill your requirements.

Write for Circular 2520

THE POWERS REGULATOR CO.
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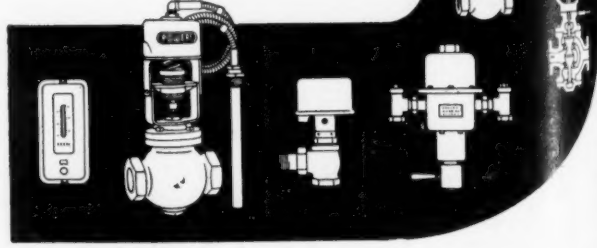
Offices in 47 Cities—See your phone directory

50 Years of Temperature and ★ Humidity Control ★



Hal Young, service engineer for *Kelite, Inc.*, Los Angeles, has returned from the Hawaiian Islands to assume a new post as service supervisor for the company in the Los Angeles area.

He spent several months in Hawaii bringing warehouse and service facilities up to date and directing improvements in the application of pH control to scientific cleaning of airplane overhaul bases, shipyards, automotive repair shops and other plants.

Manufacturers' Literature

Cleaning Equipment

A new *Bulletin No. 4E1* has just been published by the *Optimus Equipment Co.*, Dept. MF, 127 Church St., Matawan, N. J., manufacturers of washing, rinsing, pickling, and drying equipment for metal parts. This bulletin describes a complete manufacturing and engineering service offered covering units from the smallest portable type to complete automatic equipment including an entire series of metal cleaning and allied process operations.

Metal Washing Machine

Bulletin No. 19 which describes the *American Tabl-Spray Metal Washing Machine* manufactured by *American Foundry Equipment Co.*, Dept. MF, 555 S. Byrkit St., Mishawaka, Ind., has been revised to incorporate new developments in the equipment.

The American Tabl-Spray Metal Washing Machine is designed to meet the need for high-speed washing at flat, fragile work or circular parts with intricate pockets and crevices. Parts to be cleaned are placed on a mesh table in a totally enclosed cabinet and rotated through high pressure spray solutions, discharged from special machined non-clogging nozzles.

Operating sequences, mechanical features, construction specifications and details are fully covered in the bulletin. Schematic drawings and diagrams are included to illustrate the thorough spray cleaning action on the parts to be cleaned. Briefly described is the extensive metal cleaning laboratory of the company, which is equipped with practically every facility for scientific testing and analysis of metal cleaning problems. Short descriptions with illustrations of other models of the complete American Metal Washing Machine line including the Conveyor-Spray machine for washing, rinsing, and drying metal parts in one continuous operation and the Tumbl-Spray Machine are included.

Conveyors

The *Chain Belt Co.*, of Milwaukee, announces a new bulletin, No. 462, descriptive of Rex apron and pan feeders and conveyors. Rex apron and pan conveyors are used for handling coal, coke, ore, cement, rock, chemicals, bulk parts and many other materials. The bulletin contains design details, cross sections, capacity tables and specifications tabulated for quick comparison.

In addition to apron and pan conveyors,

CLEAN-RITE
All-Purpose CLEANERS

ANODES
BLACK OXIDE SALTS
BUFFS
CHEMICALS
CLEANERS
COMPOSITIONS
ELECTROPLATING EQUIPMENT
LACQUERS
PLATING RACKS
POLISHING EQUIPMENT
POLISHING WHEELS
SOLDER FLUX
STOP OFF MATERIALS
TANKS
• • •
PLATING ROOM SERVICE

Let us help you solve your problems.
Take advantage of our practical experience.

JACOB HAY COMPANY
Centralized Distributors
4014 WEST PARKER AVE. CHICAGO 39, ILL.
TEL. ALBANY 2742

KOCOUR QUINHYDRONE
pH METER

KOCOUR
QUINHYDRONE pH METER
Ideal for pH range 2-7

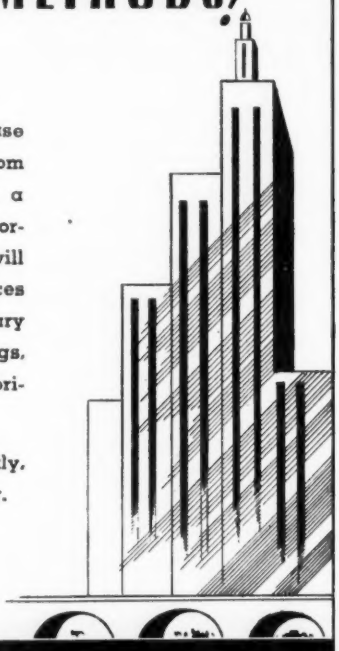
★ No wires
★ Compact and rugged
★ Direct reading
★ No calomel cell to foul
★ Simple to operate
★ No W.P.B. restrictions

Write for literature.

KOCOUR CO.
4720 S. Christiana Ave.
Chicago 32, Ill.

Specify Kocour Sets from your supplier.

MODERN INDUSTRIAL CLEANING METHODS!



Removal of heavy oils, grease and drawing compounds from steel parts often presents a difficult problem, which no ordinary cleaning material will solve. AHCOLOID 70 produces the clean surface necessary for paint, phosphate coatings, electroplating or further fabrication.

And it does its work quickly, efficiently and economically.

APOTHECARIES HALL CO.
WATERBURY 88 CONN.

-on all Cleaning Jobs
• FAST
• EFFICIENT
• ECONOMICAL

There's a PERMAG Compound for every cleaning Job

—in the Electroplating Industry

—In Metal Cleaning

—In Plant Maintenance

—for Rust Removal

—for Paint Stripping

PERMAG Cleaning Compounds

If war material orders rush your plant, and the finishing department gets in a jam—and metal cleaning isn't up to par call for PERMAG Cleaning Compounds. They will work fast and thoroughly, production will run smoothly and prevent further cleaning and finishing trouble.

Hundreds of metal fabricators are using this time-tested guaranteed cleaner PERMAG. We'll send you details.

Magnuson Products Corp.
Mfrs. Specialized Cleaning Compounds
50 COURT ST. BROOKLYN 2, N. Y.
Nationally Represented
Canadian PERMAG Products Ltd.
Montreal Toronto

McKeon's "Liquid Sulphur"
TRADE MARK REG'D

PROVEN

"THE COPPER STRIP OF TODAY"

Sent on approval.

Information and cooperation—FREE

Guaranteed

WILFRED S. McKEON, *Pres.*

Sulphur Products Co.
Greensburg, Pa.

DAVIS-K-PRODUCTS Co.

MAKERS OF

Gold Plating Solutions in All Colors

100% Pure Gold Content Guaranteed

Special rapid high amperage fine grain structure golds for Radar and acid test government specifications.

We ship all over the country—immediate delivery.

Write or call our experts about your plating problems.

DAVIS-K-PRODUCTS CO.
114 LEXINGTON AVE.
NEW YORK 16, N. Y.
LEXINGTON 2-8862

Chain Belt Company manufactures a complete line of other conveying and bulk handling machinery, process equipment and more than 2,000 sizes and types of chain belts for the handling of materials, transmission of power, and timing of operations.

Bulletin No. 462 is available by writing Chain Belt Co., Dept. MF, 1600 W. Bruce St., Milwaukee 4, Wis.

Tanks—Jars—Pots—Trays

U. S. Stoneware has issued a new 8 page bulletin which describes and illustrates their storage and mixing equipment for acids and corrosive materials.

Bulletin 405 is available without charge, on request to Process Equipment Division, U. S. Stoneware Co., Dept. MF, Akron 9, Ohio.

Blast Cleaning

A new 24-page booklet featuring 21 unusual problems in blast cleaning that required special "made to measure" equipment for production handling is being distributed by the *Pangborn Corp.*, world's largest manufacturer of blast cleaning and dust control equipment, Hagerstown, Md.

Based on the often heard theme of "My problem is different," the contents of the book, both pictures and text, is quoted as "the most diverse group of blast cleaning machines in the country. Some operations use the airless Rotoblast method, some utilize air. The work they blast clean is large, small, intricate, simple, unusual shapes and fragile.

Copies of this booklet are available by writing to Pangborn Corp., Dept. MF, Hagerstown, Md.

Pumps

"*Self-priming Centrifugal Pumps*" is the title of a handbook which has been published by *Marlow Pumps*, Dept. MF, Ridgewood, N. J.

The treatise sets forth in easy-to-understand "first reader" style, the principles of centrifugal action, the physics of pumping and the evolution of self-priming centrifugal pumps.

Copies of the handbook may be had without cost by writing to Marlow Pumps, Dept. MF, Ridgewood, N. J.

"MAYBE WE SHOULD'VE KEPT UP OUR CAR POOL, EDDIE"

CHROMIC ACID

99.75% PURE

With two complete, independent plants at Jersey City and Baltimore, and its own supply of the basic raw material Chrome Ore from company owned and operated mines, Mutual is the world's foremost manufacturer of Chromic Acid.

BICHROMATE OF SODA
BICHROMATE OF POTASH

MUTUAL CHEMICAL COMPANY OF AMERICA
270 MADISON AVENUE NEW YORK 16, N. Y.

PLATING RACKS
by JOSEPH NOVITSKY

- We specialize in plating racks of our own patent.
- Constructed without screws, rivets, solder, brazing, welding.
- We design racks to suit your individual problem.

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Control Skin Irritations

TARBONIS cuts absenteeism! Dermatitis due to cutting oils, chemical irritants, metal dust, etc., has been practically eliminated in many plants through the use of TARBONIS.

Not merely a protective, TARBONIS is also effective in clearing up a high percentage of stubborn skin conditions encountered in industry. Easy to apply—nothing to remove. Pleasant, odorless, greaseless, stainless.

FREE: A good sized jar of TARBONIS for a test in your own plant. A manual of our dispensing plan and an attractive booklet on sanitation and precaution for your employees.

THE TARBONIS COMPANY
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ZINC-STRIP

√ COMPLETE REMOVAL OF ZINC PLATE
.0002-.0003 INCHES IN ONE MINUTE

√ USE STEEL TANK

√ NO EFFECT ON STEEL BASE METAL
ALKALINE SOLUTION
STEEL IS PREPARED FOR REPLATING
MERELY BY RINSING THOROUGHLY

√ LOW COST—ECONOMICAL

SAMPLES STRIPPED—NO OBLIGATION

ALL-BRITE CHEMICAL CO.

Waterbury 89, Conn.

MFRS. OF CLEANITE METAL CLEANERS AND BLACKENING SALTS FOR STEEL

NICKEL SILVER

Sheets—Rolls

Phosphor Bronze, Bronze Gilding Metal
Low Brass and Special Alloys

WATERBURY ROLLING MILLS, Inc.

Waterbury, Conn.

Get RUST off your payroll!

No need for rust to cost you money. Science has found a new way to stop its needless waste. TECTYL gives you tested, proven, *positive* protection against rust or corrosion. Easy to apply and remove, economical to use—one of the five specialized Tectyl types will solve your special problem. Write today, indicating your corrosion-prevention needs, and we will send Tectyl bulletin with complete application data.

TECTYL
STOPS RUST

VALVOLINE OIL COMPANY
Finest Lubricating Oils Since 1866
470 Culvert Street Cincinnati 2, Ohio
Refinery at Butler, Penn. General Offices, Cincinnati, Ohio
New York - Atlanta - Detroit - Chicago - Los Angeles
Vancouver - Washington, D. C.

Worth Talking About

that's the way we feel about our reputation for quality and service.
We're interested in making new customers into old ones and that means giving you such complete satisfaction that you'll want to come back again and again. Try us!

THE ROBERTS ROUGE COMPANY
STRATFORD, CONNECTICUT
Specialists in Manufacturing of Thoroughly Dependable Gold, Sterling and Silver Plate Rouges; Stainless Steel, Chrome and Crocus Compounds

SHOP PROBLEMS

(Continued from page 114)

Hard Chromium Plating

Question: We are hard chrome plating min. .0007½" to maximum .0015" on the O. D. of sliding and internal tubes used on the tail wheels of a bomber, these tubes work like hydraulic cylinders.

The sliding tubes work against a bronze collar, and of course, eliminates any friction and gives it a fairly good protective coating against rust.

What we would like to know is how we can make our customer understand the importance of a super finish on the basis metal. They have been supplying us with a fairly good finish as far as the machinist viewpoint goes, but when we have chemically cleaned the tube and hard chrome plated same, the marks are of course more pronounced and don't have a smooth feel to the touch. The small internal tube we buff with a good fast cutting paste such as chrome color, which imparts a brilliant lustre, but as the large one is too heavy to buff by hand, we can only give it a minimum finish. The small tube feels smooth to the touch after plating, but the large tube feels rough. It is understood that a good grinder can make a piece of tube as bright as a buffed job, by eliminating his marks from step to step, please confirm this, also if you have any data on wheels used.

Another feature of the above job, is that all firms have to be R. C. A. F. approved as to the hardness of the chrome deposited. We have supplied samples of our chrome on 24 gauge cold rolled steel, and the report has shown that our chrome is too soft. Actually they cannot touch it with a file, but maintain that the Vickers test which is a diamond pressure test, shows the deposit ¼ of the hardness desired. Vickers 750 minimum. Please advise us if it is possible to test for hardness on 24 gauge soft cold rolled steel with a deposit of .002" of hard chrome direct on the soft metal.

R. P. P. Co., Ltd.

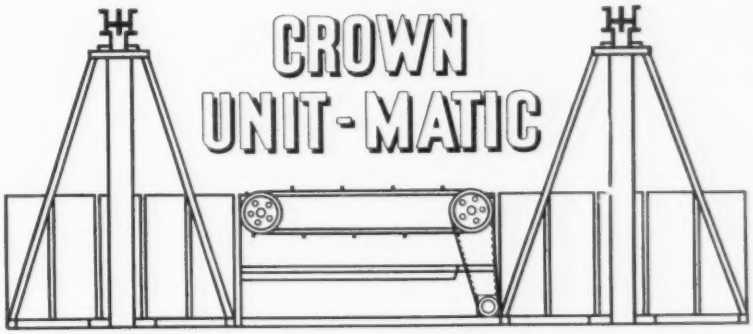
Answer: We would suggest that you get in touch with manufacturers of abrasive wheels, as they may be in a position to advise as to the proper grinding and polishing procedures. Such procedures can produce a mirror finish.

We doubt that your chromium deposit is only ¼ as hard as the required 750 Vickers, especially since it is not scratched by a file. Cymboliste (Trans. Electrochemical Soc., 73, 137, 1938) deposited chromium under various conditions and obtained no deposits of less than 450 Brinell which would correspond to about 475 Vickers.

Army-Navy Aeronautical Specification AN-P-39 specifies that the test sample be of the same type of steel as the products and that the chromium deposit should not be less than 0.002" for the test. The hardness test will give low results on the soft base such as cold rolled steel, especially with thin deposits. We would suggest that a hard steel sheet about 0.040" thick minimum be used for a test plate.

Crown

BRINGS TO THE PLATING INDUSTRY THE OUTSTANDING EQUIPMENT DEVELOPMENT DURING THE PAST QUARTER OF A CENTURY



(PATENT APPLIED FOR)

FULLY AUTOMATIC
PARTIALLY AUTOMATIC
EQUIPMENT

FOR
PLATING
ANODIZING
CLEANING
PICKLING

CROWN RHEOSTAT & SUPPLY CO.
1910 MAYPOLE AVE. CHICAGO, ILL.

COMPOUNDS: Burring, Cutting Down, Polishing, Mirror Finishing.
4A CEMENT: Used for setting up Wheels, Belts, Buffs & etc.

HARRISON & COMPANY, INC., Haverhill, Massachusetts

Slow Deposit

Question: We are having considerable trouble getting our hard chrome bath to deposit at the proper rate, namely 0.001″ per hour, we are using the conventional bath of 33 oz./gal. of chromic acid and a sulphate ratio of 1:100. We have had the bath analyzed and the concentration and ratio is in order, but it will only deposit approximately 0.00025″ per hour. I understand that impurities in the bath may cause this condition. I would appreciate it if you could suggest what impurities are most likely to cause this condition and the concentrations of same when trouble may be anticipated. The current density used is approximately 2.0 amperes per square inch of surface area. We are 100% on war work and do a considerable amount of tool salvage work. The condition of the deposit is hard and bright, but due to the slow rate of deposition we are far behind schedule and the condition is getting serious.

R. A.

Answer: We would suggest that you look for current leaks on your fixtures and connections in order to determine whether the chromium is being deposited where it is not supposed to.

Your solution should also be analyzed for iron, copper, and trivalent chromium contents, as these will affect the efficiency.

Answer Key

9, 8, 10, 4, 1, 3, 7, 5, 2, 6 in the order listed.

VULCAN SODIUM STANNATE

Manufactured by

THE VULCAN DETINNING CO.
SEWAREN, N. J.

Under Patents Nos. 1,575,217 and 1,708,392

FOR TIN ELECTROPLATING

SALES AGENT

The Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

A Complete Line of Requirements for the Electroplating Industry

MUNNING

MUNNING & MUNNING, Inc.
Manufacturers of Electroplating, Buffing, Polishing Apparatus and Supplies.
202-208 Emmet St. Newark, N. J.
Branch Offices: New York, Philadelphia, Woonsocket, R. I.

Truly—Three Great Finishes!!

CHROMIUM—UDYLITE SHERARDIZING

For over a quarter of a century building and installing portable sherardizing furnaces and equipment; metal finishing and plating. We invite your inquiry.

THE NATIONAL SHERARDIZING & MACHINE CO.
Office & Factory Hartford, Conn.

Foreign Representatives—Oliver Bros., Inc.
417 Canal St., N. Y. City

CHROMIUM PLATING SCREWS—RIVETS—WASHERS SMALL PARTS, ETC.

THE CHROMIUM PROCESS CO.
Shelton, Conn.

NOTICE—NOTICE

We have developed a machine for light buffing, coloring and scratch brushing which is indispensable in every shop.

Cost of power consumption is approximately one cent (1c) per hour.

Please send for literature and photograph.

LEWIS ROE MFG. COMPANY
1042-1050 DeKALB AVE.
BROOKLYN, NEW YORK

OXY-DYZ-ENE

HIGHEST STRENGTH
OXIDIZING AGENTS
POSSIBLE TO PRODUCE
Sold in LUMP and LIQUID FORMS by Leading Plater Supply Houses
Manufactured For 68 Years By
KREMBS & COMPANY
669 W. OHIO ST. CHICAGO, U.S.A.

Try **PLATER'S PUTTY**
A New Stop-off or masking compound

Prices	1 lb. jar	$3.00
REZISTAL "A"	2 lb. jar	5.00
	5 lb. jar	10.00

Order a trial jar today—guaranteed satisfaction
PLATING PROCESSES CORP. • Holyoke, Mass.

FOR WAR PRODUCTION—FOR POST-WAR PLANS

NICKEL, CHROMIUM, BRASS OR COPPER Electro-Bonded SHEETS · COILS TO ZINC, STEEL, BRASS, COPPER, ALUMINUM OR TIN PLATE

AMERICAN NICKELOID COMPANY - 8 Second St. Peru, Illinois

INSULATED PLATING RACKS
SPECIAL AND STANDARD SIZES
For all parts regardless of shape. We specialize in your rack problem.
STANDARD PLATING RACK CO.
1925 N. Paulina St., Chicago, Ill.
ARMITAGE 6766

SOMMERS BROS. MFG. CO.
MFRS. OF "BEACON"
Plating and Polishing Supplies and Equipment—Complete Semi and Full Automatic Installations—Gold, Silver and Chrome Rouge, Stainless Steel and Satin Finish Compounds—Buffs, Polishing and Felt Wheels.
SAMPLES FURNISHED ON REQUEST.
3439 NO. BROADWAY ST. LOUIS 7, MO.

ODDS and ENDS

Washingtonia:

If the *War Production Board* says that a tire is not a tire, then the tire is not a tire, and that's that! From WPB Release 1170: "Portable milking machines may be made with rubber tires less than 2¼ inches in cross-section. The type of tires required for portable milking machines is not produced with tire-making facilities and is not considered a 'tire.'"

A WPB spokesman says that pipe tobacco will be scarce. The spokesman obviously is not a member of the pipe-smoking fraternity, which includes the perpetrator of these columns, since, if he were, he would know that pipe smokers do not use tobacco—only matches.

Live and Learn:

In 1854, Napoleon III used "*the rare metal aluminum*" for flatware at state banquets and *indium* was once worth $20,000 per ounce. How times have changed!

The chlorine used to manufacture trichlorethylene in 1943 would be sufficient to purify New York City's water supply for 100 years at the rate of 1,000 tons per year.

Oil is applied to the surface of tinplate to prevent oxidation, to facilitate feeding of plates from stacks and to act as a lubricant in dies. *Four drops* of oil are spread over *435 square feet* in a uniform film, the thickness being 0.0000002". That's about how thick we're allowed to spread the butter on our bread at our house these days!!

Most people believe the Army term "G.I." to be an abbreviation of "Government Issue." It should interest the plating industry to know that it derives from the identification stamped on Army hardware during the American Revolution—to designate *Galvanized Iron.*

Live and Never Learn:

Lives there a plater who has never been present when an accumulation of hydrogen and oxygen gas on the surface of an electrolytic cleaner or similar tank was set off by a flame or spark?? Recently, we decided that our car battery was run down, due to winter starting. We therefore connected a small battery charger and let it run overnight in our garage. The next morning, we were too lazy to get a flashlight out of the glove compartment, in order to check the water level in the battery, so we lit a match and held it to the filler hole, without thinking. The resulting pop was somewhat of a shock, but, more shocking was the impact of 35% sulfuric acid on our freshly shaven and somewhat tender physiognomy. While relaxing under the soothing effect of a double handful from a nearby snowpile, we had time to meditate on the desirability of remembering one's technical training.

We just heard the following: Before rationing people would step on the gas and sit. Now they sit on the step and gas!

How Much Do You Know:

(Prepared by George Black)

Match the process listed in Column I with the Specification listed in Column II

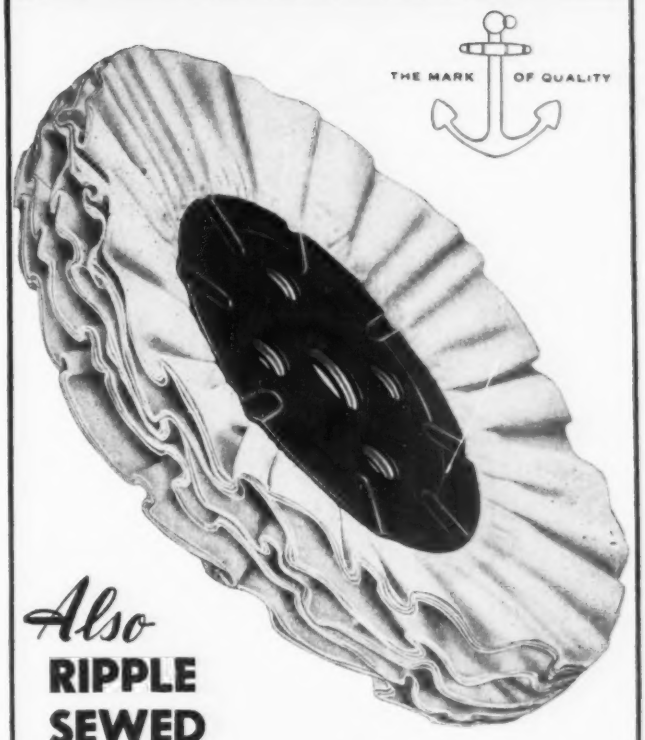
Column I	*Column II*
(1) Cadmium Plating	( ) Army 57-0-2
(2) Zinc Plating	( ) AN-M-8
(3) Anodic Oxidation	( ) AN-P-34
(4) Tin Plating	( ) Navy PC-12
(5) Dichromate Treatment	( ) AN-P-61
(6) Chromium Plating	( ) AN-QQ-A-696
(7) Passivation	( ) Navy SR-39
(8) Metallizing	( ) AN-M-12
(9) Phosphate Coating	( ) AN-P-32
(10) Nickel Plating	( ) AN-P-39

See answer key on page 142.

Slogan of the Month:

You're Not Asked to Lay Down Your Life—Just Your Money! Buy War Bonds!

Ventilated
NON-FRAYS



Also
RIPPLE
SEWED

CHAMPION
PIECED BUFFS

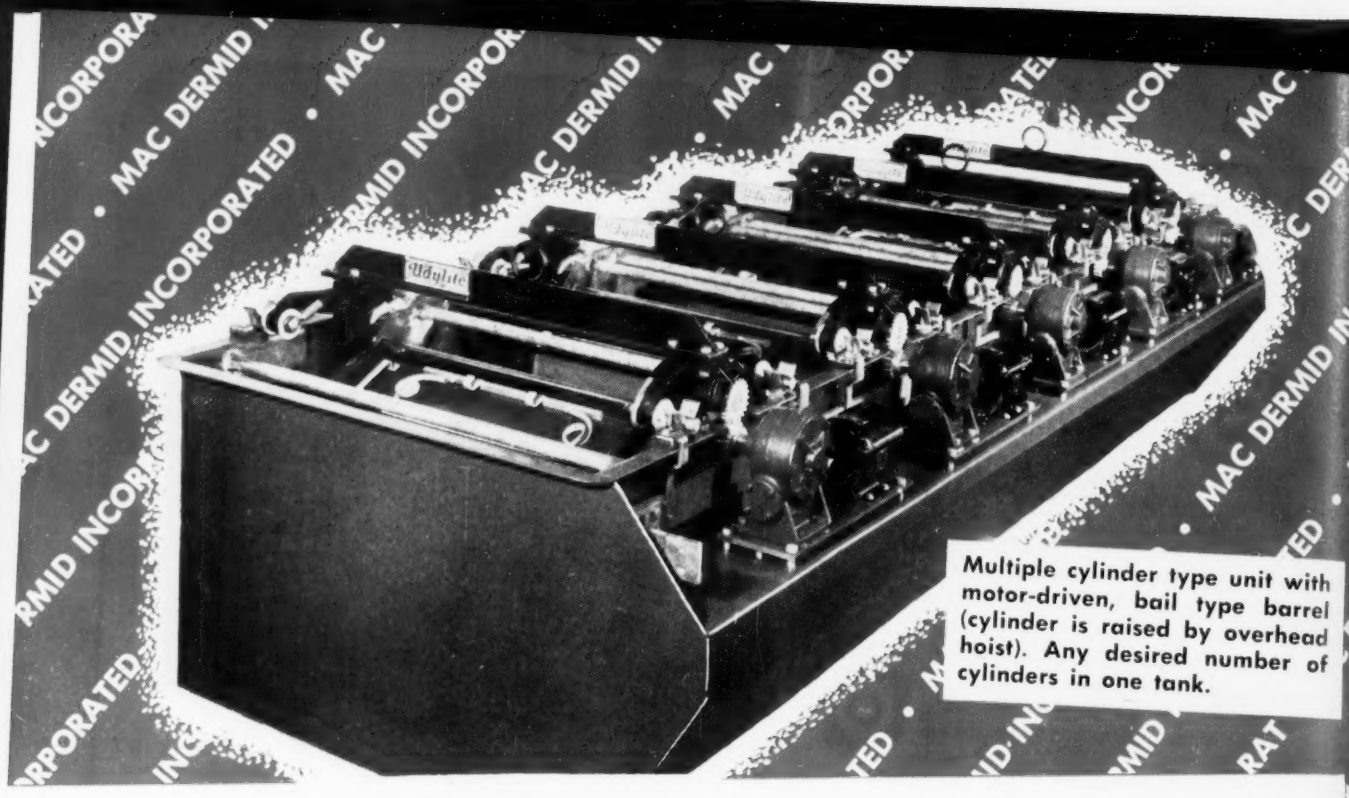
Polishing Wheels and Burring Bobs for every Operation

We are engaged essentially in War Work

*Patent Nos. 2,027,863; 2,094,650; 1,573,961; Re. 19,894; 2,140,208

F.L.&J.C.
TRADE MARK
CODMAN
COMPANY
Buffing and Polishing Wheels

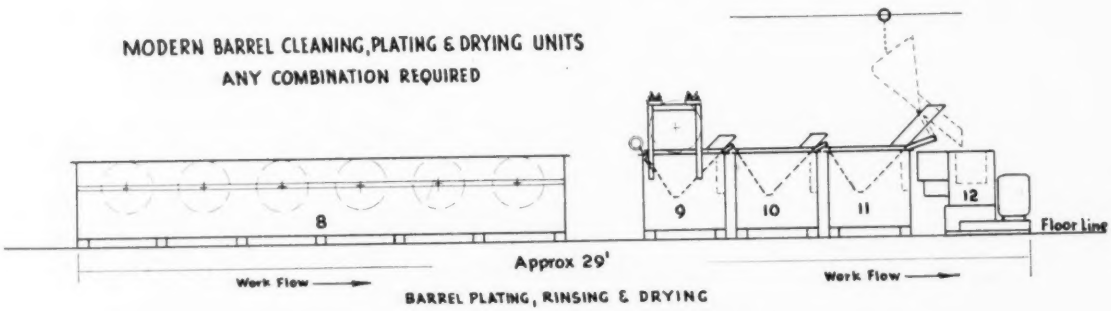
ROCKLAND • MASSACHUSETTS
DETROIT OFFICE 7637 OAKLAND AVENUE
PHILADELPHIA OFFICE, 1123 REAL ESTATE TRUST BLDG.
PHILADELPHIA 7, PENNSYLVANIA



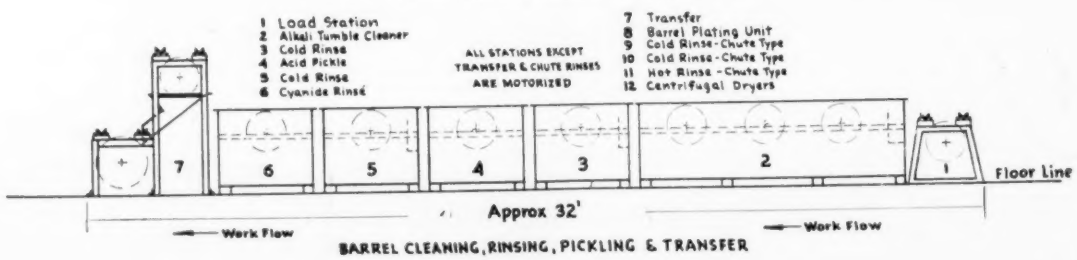
Multiple cylinder type unit with motor-driven, bail type barrel (cylinder is raised by overhead hoist). Any desired number of cylinders in one tank.

New England Manufacturers . . . **Consult MAC DERMID INC. for advanced information on "up to date" barrel plating equipment. Have our Sales Engineer show you detailed prints and photographs of the equipment illustrated or if desired, ask him to arrange for a demonstration in your neighborhood. The cycle illustrated below is recommended for barrel cleaning, rinsing, pickling, transfer, plating, rinsing and drying.**

MODERN BARREL CLEANING, PLATING & DRYING UNITS
ANY COMBINATION REQUIRED



BARREL PLATING, RINSING & DRYING



BARREL CLEANING, RINSING, PICKLING & TRANSFER